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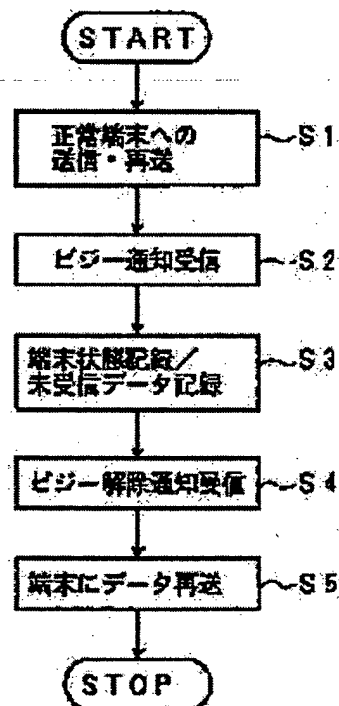
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## (54) DATA RESENDING METHOD AND SERVER

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To improve the efficiency of data transfer to all of many terminals by making a server transmit and retransmit data preferentially to many normal terminals and resend only unreceived data to a terminal which becomes busy and a terminal with low receiving performance at server's convenient time.

**SOLUTION:** This server performs the data transmission and retransmission preferentially to many normal terminals (step 1) and retransmits only the unreceived data to the terminal which becomes busy and the terminal with low receiving performance at server's convenient time (step 2). Further, the server records the states of the terminals and the status of the unreceived data and performs individual state management different from the states of other normal terminals (step 3), and when a busy state reset report showing that reception is enabled is received from the terminal (step 4), the state of the terminal and the status of the unreceived data are referred to, thereby resending the data to the terminal at server's convenient time according to the record.



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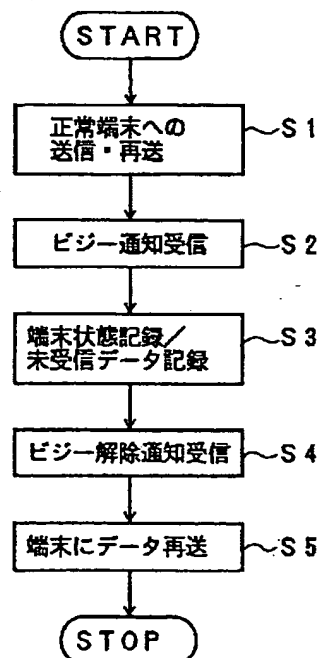
(54)【発明の名称】 データ再送方法及びサーバ

(57)【要約】

【課題】 サーバがある端末からビジー通知を受信したとき、サーバはこの端末を他の正常端末と同等に状態管理を行うと、他のビジーでない正常端末へのデータ送信、再送も中断してしまう。

【解決手段】 本発明は、サーバは、一時的に受信不能となった端末からビジー通知を受けた場合に、端末の状態を記録し、端末の状態と未受信データの状況を記録し、他の正常端末の状態とは別の個別状態管理とし、端末から受信可能となったことを示すビジー解除通知を受け取った場合には、端末の状態と未受信のデータの状況を参照し、該記録に基づいて、サーバの都合がよいときに、端末へのデータの再送を行う。

本発明の原理を説明するための図



## 【 特許請求の範囲】

【 請求項1 】 通信ネットワークを介して接続される複数の端末に対して、サーバがデータ送信を行い、該端末がデータの全てを受信できない場合に再度データの再送を行うデータ再送方法において、

前記サーバは、多数の正常端末への送信、再送を優先してデータ送信を行い、

サーバの都合のよいときに、未受信データのみをビジーとなった端末や受信性能の低い端末へ再送ことを特徴とするデータ再送方法。

【 請求項2 】 前記サーバは、データの全てを正常に受信できた端末の状態管理表Aから、データの全てを正常に受信できなかった端末に対応する、または、複数の状態管理表を派生し、

送信の進行に従った前記状態管理表Aの状態遷移と並行して、別の状態管理を行う請求項1記載のデータ再送方法。

【 請求項3 】 前記サーバは、

一時的に受信不能、または、受信能力が低下した端末から、その旨の信号を受けた場合には、前記状態管理表Aにおける当該端末の遷移を凍結し、該状態を記録し、その後、当該端末から受信可能となった旨の信号を受け取った場合には、当該端末の状態と、未受信のデータの状況を、前記凍結記録された状態から復元し、当該端末へのデータ送信を再開する請求項2記載のデータ再送方法。

【 請求項4 】 前記サーバは、

一時的に受信不能、または、受信能力が低下した端末から、その旨の信号を受けた場合には、前記状態管理表Aにおける、当該端末の状態遷移を凍結記録し、状態管理表Bを新たに開き、状態を前記状態管理表Aから引継ぎ、

前記状態管理表Bに従って、前記端末への再送制御を実行し、その後、当該端末から受信可能となった旨の信号を受け取った場合には、前記端末の状態遷移を、前記状態管理表A上で再開し、その際に、前記状態管理表Bの状態から未受信データの状況を引継ぎ、前記端末へのデータ送信を再開する請求項2記載のデータ再送方法。

【 請求項5 】 通信ネットワークに接続される複数の端末間でデータ送信を行い、該端末がデータの全てを受信できない場合に再度データの再送を行うサーバにおいて、

前記サーバは、

正常端末への送信、及び再送の状態管理と、ビジー通知を発行した端末、受信性能が低いと判断した端末の状態管理を分けて行う管理手段と、

前記管理手段に基づいて端末へのデータ送信を行う送信手段とを有することを特徴とするサーバ。

【 請求項6 】 前記管理手段は、

送信データを正常受信した正常端末の状態を管理する正

常端末管理手段と、

前記端末の状態として、ビジー状態、ビジー解除状態、低性能状態をそれぞれ個別に管理する個別管理手段とを有する請求項5記載のサーバ。

【 請求項7 】 前記管理手段は、

前記正常端末管理手段で管理されていた端末が正常状態から異常状態に遷移した場合には、前記個別管理手段に管理を移行し、前記個別管理手段で管理されていた端末が正常状態に遷移した場合には、正常端末管理手段に移行する状態管理移行手段を更に有する請求項5記載のサーバ。

【 請求項8 】 前記個別管理手段は、

端末からビジー通知を受信すると、端末におけるパケットの受信・未受信を記憶する再送管理手段と、

前記端末から前記ビジー通知を受け取った場合には、ビジーであることを管理し、ビジー解除通知を受け取った時にデータ再送が可能であることを管理する端末状態管理手段とを有する請求項6記載のサーバ。

【 請求項9 】 前記個別管理手段は、

前記端末から前記送信データに対する否定応答があった場合に、該端末が低性能であるかを判定する第1の低性能判定手段と、

前記端末から前記送信データに対する応答がない場合に、

所定の回数のタイムアウトを越えて応答がない場合に低性能端末と判定する第2の低性能判定手段と、

前記第1の低性能判定手段または、前記第2の低性能判定手段において、低性能と判定された端末を前記正常端末管理手段から除外する除外手段とを有する請求項6記載のサーバ。

【 請求項10 】 前記送信手段は、

前記正常端末管理手段において管理されている前記正常端末へのデータ送信を優先させ、次いで前記正常端末への送信が終了後に前記個別管理手段により管理されているビジー通知の発行元の端末または、前記低性能端末のうち、個別送信が可能と判定された端末にデータの再送を行う請求項5記載のサーバ。

【 請求項11 】 前記ビジー解除通知には、未受信のパケット番号を含む請求項8記載のサーバ。

【 発明の詳細な説明】

【 0001 】

【 発明の属する技術分野】 本発明は、データ再送方法及びサーバに係り、特に、サーバが複数の端末に対してマルチキャスト（宛先指定同報）等によりデータ送信を行い、受信データの紛失や誤りがあった場合に、サーバから端末に再送を行うデータ再送方法及びサーバに関する。

【 0002 】

【 従来の技術】 一般に、サーバが複数の端末に対してデータを送信するデータ通信においては、送信側のサーバが一連のデータを適当な大きさのデータ（以下、パケッ

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トと呼ぶ)に分割して複数の端末に送信した後、各端末は、正常受信の肯定応答あるいは未受信のデータに関する情報を否定応答としてサーバに返し、サーバはこれらの応答に基づいて再度複数の端末に対してパケットの再送を行う。

【0003】図14は、従来の複数端末へのデータ再送シーケンスを示す図である。サーバが複数端末に対してデータ送信した後、各端末から応答を返し、これらの応答に基づいてサーバが再送データを生成し、データ再送を行う手順を繰り返していることを示している。

【0004】同図において、サーバから端末1、2、3の3つの端末に対して、データ送信を行う。これにより、端末から正常受信または、異常受信の旨が応答される。ここで、サーバが端末1、2、3にデータ送信した結果、正常応答があったのは、端末1だけであるので、端末2、3に対してデータの再送を行う。ここで、端末2からは正常受信の旨の応答があったが、端末3からは異常応答であるので、再度、サーバは、再送データを生成して、当該データを端末3にデータを再送する。

【0005】また、従来の記述では、端末が一時的に受信不能(ビジー)となった時に、サーバに対して、ビジー通知を送信し、当該ビジー端末へのデータ送信の中断を要求し、当該端末が受信可能となった時に、端末がビジー解除通知を送信するデータ再送方式がある。図15は、従来のビジー通知によるデータ再送シーケンスを示す。サーバがデータ送信中に一時的に受信不能となった端末(ビジー端末)からビジー通知を受けると、当該端末へのデータ送信を中断し、当該端末からビジー解除通知を受信した後データ送信を再開する手順を示している。

【0006】同図において、サーバが端末に対してデータを送信すると、端末がビジーであるため、一時的に受信不能状態にある例である。この場合は、サーバからデータを送信しても、端末からビジー通知が発行されるため、サーバは、このビジー通知を受信すると、データ送信を中断する。さらに、端末が受信可能状態に移移すると、ビジー解除通知をサーバに送信する。これにより、サーバは、端末に対してデータの送信を再開する。

【0007】

【発明が解決しようとする課題】しかしながら、上記の2つの従来方式を組み合わせる用いるときに、サーバがある端末からビジー通知を受信したとき、サーバはこの端末を他の正常端末と同等に状態管理を行うと、他のビジーでない正常端末へのデータ送信、再送も中断してしまうのでデータ通信全体の効率が著しく低下するという問題がある。

【0008】また、同じ状況で、当該端末への通信を状態管理から外してしまうと当該端末への再送は受信済みのデータも含めて最初からやり直す必要があり、当該端末への通信効率が著しく低下する。また、上記従来技術

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の前者の方式において、データ受信状況のよくない端末を他の多くの正常端末と同等に扱ったと、この端末の受信性能に引きずられて、再送の回数が増えるにつれ、端末全体へのデータ通信効率が低下するという問題がある。

【0009】また、同じ状況で、当該端末への通信を状態管理から外してしまうと当該端末への再送は受信済みのデータも含めて最初からやり直す必要があり、当該端末への通信効率が著しく低下する。以上の問題は、特にサーバが1度の送信処理で複数の端末に対して同報を行うマルチキャスト通信においてデータ再送を行う場合に顕現する。

【0010】本発明は、上記の問題点に鑑みてなされたものであり、多数の正常端末への送信、再送を優先して、ビジーとなった端末や受信性能の低い端末への再送はサーバの都合のよいときに、受信済みのデータの再送を行うことなく、未受信データのみを当該端末に再送することを可能とし、当該端末への再送データを軽減しつつ多数の正常端末への送信を優先して行うことが可能な、データ再送方法及びサーバを提供することを目的とする。

【0011】

【課題を解決するための手段】本発明は、通信ネットワークを介して接続される複数の端末に対して、サーバがデータ送信を行い、該端末がデータの全てを受信できない場合に再度データの再送を行うデータ再送方法において、サーバは、多数の正常端末への送信、再送を優先してデータ送信を行い(ステップ1)、サーバの都合のよい時に、未受信データのみをビジーとなった端末や受信性能の低い端末へ再送する(ステップ2)。

【0012】また、本発明は、サーバにおける各端末の状態管理を行う際に、正常端末の状態から一つまたは複数の個別状態管理を派生し、正常端末の状態管理と平行して、個別状態管理も行う。図1は、本発明の原理を説明するための図である。

【0013】本発明において、サーバは、一時的に受信不能となった端末からビジー通知を受けた場合に(ステップ2)、端末の状態を記録し、端末の状態と未受信データの状況を記録し、他の正常端末の状態とは別の個別状態管理とし(ステップ3)、端末から受信可能となったことを示すビジー解除通知を受け取った場合には(ステップ4)、端末の状態と未受信のデータの状況を参照し、該記録に基づいて、サーバの都合がよいときに、端末へのデータの再送を行う(ステップ5)。

【0014】また、本発明において、サーバは、端末の受信状況が良好でない時に、該端末を他の正常端末の状態とは別の個別状態管理とし、当該端末の状態と未受信データの状況を記録し、記録に基づいて、サーバが都合の良い時に当該端末へのデータの再送を行う。

【0015】図2は、本発明の原理構成図である。本発明は、通信ネットワークに接続される複数の端末間でデ

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ータ送信を行い、該端末がデータの全てを受信できない場合に再度データの再送を行うサーバ100において、サーバ100は、正常端末への送信、及び再送の状態管理と、ビジー通知を発行した端末、受信性能が低いと判断した端末の状態管理を分けて行う管理手段10と、管理手段10に基づいて端末へのデータ送信を行う送信手段30とを有する。

【0016】上記の管理手段10は、送信データを正常受信した正常端末の状態を管理する正常端末管理手段40と、ビジー状態、ビジー解除状態、低性能状態をそれぞれ個別に管理する個別管理手段20を有する。上記の管理手段10は、正常端末管理手段40で管理されていた端末が正常状態から異常状態に遷移した場合には、個別管理手段20に管理を移行し、個別管理手段20で管理されていた端末が正常状態に遷移した場合には、正常端末管理手段40に移行する状態管理移行手段を更に有する。上記の個別管理手段20は、端末からビジー通知を受信すると、端末におけるパケットの受信・未受信を記憶する再送管理手段21と、端末からビジー通知を受け取ると、ビジーであることを管理し、ビジー解除通知を受け取ると、データ再送可能であることを管理する端末状態管理手段22とを有する。

【0017】上記の個別管理手段20は、端末から送信データに対する否定応答があった場合に、該端末が低性能であるかを判定する第1の低性能判定手段23と、端末から送信データに対する応答がない場合に、所定の回数のタイムアウトを越えて応答がない場合に低性能端末と判定する第2の低性能判定手段24と、第1の低性能判定手段23または、第2の低性能判定手段24において、低性能と判定された端末を正常端末管理手段40から除外する除外手段25とを有する。

【0018】上記の送信手段30は、正常端末管理手段40において管理されている正常端末へのデータ送信を優先させ、次いで正常端末への送信が終了後に、個別管理手段20により管理される、ビジー通知の発行元の端末または、低性能端末のうち、個別送信が可能と判定された端末にデータの再送を行う。

【0019】また、ビジー解除通知には、未受信のパケットの識別子を含む。上記により、サーバ2において正常端末への送信、再送の状態管理とは別にビジー通知を受信した端末および受信性能が低いと判断した端末に対して正常端末とは別に状態管理を行うことにより解決される。具体的には以下の通りである。

【0020】サーバ100において、端末の状態(ビジー状態、ビジー解除状態、低性能状態、正常状態等)を記憶する端末状態管理手段22と正常状態時とともにビジー通知受信後および低性能と判断した後も当該端末における各パケットの受信/未受信を記憶する再送管理手段21を設ける。

【0021】また、サーバに100において端末が低性能

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状態であることを判定する第1、第2の低性能判定手段23、24を設ける。サーバ100は、端末からビジー通知を受け取ったときに、当該端末がビジーになったことを端末状態管理手段22に記録し、かつ、再送管理手段21において各パケットの受信/未受信状態の記録をそのまま保持する。(当該端末の最近の受信状況は否定応答により記録されている。否定応答がない場合は、パケットは全て未受信である。)これにより、以降、ビジー端末の状態およびパケット受信状況は正常端末とは区別して管理できる。

【0022】サーバ100は、当該端末を正常端末から除外して他の端末への送信、再送を継続する。ビジー端末は、受信可能となったときにサーバにビジー解除通知を出し、サーバはビジー解除通知を受け取ると端末状態管理手段22において端末がビジー解除されたことを記録する。ビジー解除通知には未受信パケットの番号を含めておき、サーバは再送管理手段のパケットの受信/未受信状態の記録を更新し保持しておく。

【0023】サーバは、自己の都合が良い時に、例えば、正常端末への送信、再送終了後に、端末状態管理手段22を参照してビジー解除されているビジー解除端末に対してデータ再送を行う。ビジー解除されていないビジー端末については、サーバは、ビジー解除通知が来るまで待ってから再送する。このサーバにおけるビジー解除通知待ちについては、タイマ監視により所定時間待たず、タイムアウトした端末については、通信を打ち切る。

【0024】サーバは、第1、第2の低性能判定手段23、24において、端末からの否定応答、未応答の状況に基づいて当該端末を低性能状態と判定し、当該端末が低性能になったことを端末状態管理手段22に記録し、かつ、再送管理手段21において各パケットの受信/未受信状態の記録をそのまま保持する。(当該端末の最近の受信状況は否定応答により記録されている。否定応答がない場合は、パケットは全て未受信である。)これにより、以降、低性能端末の状態およびパケット受信状況は正常端末とは区別して管理できる。

【0025】特に、未応答のタイムアウトのについては、漠然と長い時間待つのではなく、問い合わせパケットにより、応答を督促し、タイムアウトを規定回数許容し、この回数を越えた時に、低性能と判定する。これにより、明確に低性能と判定でき、漠然と待機するより、短時間で判定し、次のラウンドの正常端末への送信(マルチキャストの場合は、マルチキャスト再送)に遷移できるので、効率の良いデータ再送を行うことができる。

【0026】サーバは自己の都合の良いときに、例えば、正常端末への送信、再送の終了後に、低性能端末に対してデータ再送を行う。ビジー端末への再送、低性能端末への再送のいずれを優先するかはシステム毎に方針が異なってもよい。ビジー解除待ちの空き時間に低性能

端末への再送を行うと効率が良い。

【0027】以上により、サーバは正常端末へのデータ送信、再送を優先し、ビジー端末、低性能端末に対しても受信済みのデータを再送することなく未受信のデータのみを再送できる。この結果、正常端末へのデータ送信、再送を中断させたり性能劣化させることなく、また、ビジー端末、低性能端末への再送を最初からやり直す必要がなく、データ通信全体の効率を向上させることができる。

【0028】

【発明の実施の形態】以下、本発明の実施例を図面を用いて説明する。図3は本発明を適用した情報通信システム構成を示す。同図に示すシステムは、サーバ100、通信ネットワーク200、複数の端末300より構成される。同図のシステムは、サーバ100が複数の端末300にデータを送信した後、各端末300から受信確認の肯定応答あるいは再送情報を含む否定応答を返送される様子を示している。

【0029】図4は本発明の動作の概要を示す。サーバにおいて、正常端末の状態管理から、個別の状態管理が派生する様子を示している。同図は、サーバ100から4つの端末300-1、300-2、300-3、300-4に対してデータ送信を行うシステムを示す。

【0030】最初に、サーバ100における特定のイベントにより、当該端末300の個別状態管理を開始する。正常端末の管理と平行して一つまたは複数の個別状態管理を行う。例えば、図4ではサーバ100がビジー通知を受信したときに、当該端末300-3をビジー端末として状態管理を始める。サーバ100が低性能と判定したときに当該端末300-4の低性能端末としての状態管理が始まる。いずれの場合も、他の正常端末300-1、300-2の状態管理は継続する。

【0031】図4において、サーバ100が端末300-1、300-2、300-3、300-4に対してデータ送信を行うと、端末300-1、300-2からは、正常通知(データ受信完了通知)を受信し、端末300-3からはビジー通知を受信する。このとき、端末300-3に対しては、ビジー端末として個別状態管理を行う。さらに、端末300-4については、異常通知が届いたため、個別状態管理を開始し、タイムアウトを所定回数以上繰り返したため、低性能と判定し、個別状態管理を行うものとする。

【0032】図5は、本発明のサーバの構成を示す。同図に示すサーバ100は、再送制御部101、通信制御部102、アプリケーション管理部103、再送管理部104、データ構成部105、端末状態管理部106及び、端末性能判定部107より構成される。

【0033】再送制御部101は、アプリケーション管理部103からのデータ送信要求に基づいてデータ通信を通信制御部102を通して行う。送信データはデータ

構成部105において構成される。再送管理部104では図6に示す再送管理テーブル1041により全端末300の packets 受信状況(シーケンス番号が付けられた各パケットの端末毎の受信済み/未受信の区別)を管理している。ビジー端末の受信状況もこれに記憶されている。再送管理テーブル1041は、図6に示すように、各端末においてパケット番号に対応したパケットが受信済み(○)であるか、未受信(×)であるかを示すことができる。実装上は○にビットオン(1)、×にビットオフ(0)を対応させることにより、実現できる。

【0034】再送管理テーブル1041は、パケット再送のための各端末の packets の受信状況(パケット受信の成否)の管理に用いる。再送管理テーブル1041は、正常端末およびビジー端末、低性能端末で共用することができる。但し、処理効率の観点から、ビジー端末あるいは低性能端末の個別状態管理が始まった時点で当該端末に関するテーブルの行をコピーして端末ごとに別のテーブル(行のみ)を設け、これにより各端末の再送状況を管理することもできる。この場合には、各端末(ビジー端末、低性能端末)の個別再送が完了した時点で、元の再送管理テーブルに結果を報告することにより、元の再送管理テーブルにおいて端末全体のデータ再送の完了状況が把握できる。

【0035】端末状態管理部106では、各端末毎に正常通信状態、ビジー状態、ビジー解除状態、低性能状態等のいずれの状態であるかを管理し記憶する。これは、通信ネットワーク200を介して端末300からの応答フレームの内容を解析して状態を認識する。

【0036】図7に通信フレームの内容を示す。同図(A)は、サーバ100から端末300に対して送信する問い合わせのフレームであり、端末宛先P01、サーバ宛先P02、パケット種別P0Tから構成される。サーバ宛先P02は、問い合わせ時の発信元のサーバのアドレスを設定する。パケット種別P0Tは、問い合わせのデータの packets 種別を整数値で区別する。

【0037】同図(B)は端末300からサーバ100に対して送信されるビジー通知を示し、サーバ宛先B01、端末I D02、パケット種別B0Tより構成される。パケット種別B0Tはビジー通知の種別を整数値で設定する。同図(C)は、端末300からサーバ100に対して送信されるビジー解除通知を示し、サーバ宛先B01、端末I D02、パケット種別B0T、未受信 packets 番号列B03より構成される。ここでパケット種別B0Tはビジー解除通知の種別を示す整数値を設定する。

【0038】同図(D)は、サーバ100から端末300に対して送信される低性能通知を示し、サーバ宛先B01、端末I D02、および各端末におけるビジー解除通知送出時点での未受信 packets の番号列B02を含む。未受信 packets の番号列は、通常、端末からの否定

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応答に含まれる未受信パケット番号列と同等であり、数値列、適当な範囲記号等を含んでいる。パケット種別D0Tは、低性能通知の種別を示す整数値を設定する。付加情報D03は、個別再送の時期等の付加情報であり、端末において、いつ頃データ再送が再開されるのか知っていることにより予め受信準備が可能となる。

【0039】端末性能判定部107は、端末300からの応答に基づいて当該端末が低性能状態となったか否かを判定する。端末から否定応答、または、未応答のタイムアウトの状況に基づいて当該端末を低性能端末と判定し、その判定結果を端末状態管理部106に通知する。なお、未応答のタイムアウトについては、問い合わせパケットにより応答を催促し、タイムアウトが規定回数を越えた時に、低性能と判定する。

【0040】図8は本発明のビジー端末と判定された場合の再送シーケンスを示す。同図において、センタ100からデータを送信した際に、端末300-3がビジー状態にあるものとし、端末300-1、300-2は正常状態であるとする。サーバ100がデータ送信中に、端末300-3よりビジー通知を受けると(ステップ101)、サーバ100は当該端末300-3がビジー状態になったことを端末状態管理部106に記録する(ステップ102)。サーバ100は端末300-3の状態をこれ以後、正常端末とは別に管理する。ビジー端末の記録後もサーバは正常端末への送信、再送、応答受信等の通信を継続する。

【0041】次に、端末300-3からビジー解除通知を受信する(ステップ103)と、サーバ100は端末300-3がビジー解除状態となったことを端末状態管理部106に記録する(ステップ104)。同時に、ビジー解除通知に含まれている未受信パケット番号列を再送管理部104の再送管理テーブル1041に記録する。ビジー解除の記録後もサーバ100は正常端末300-1、300-2との通信を継続する(ステップ105)。

【0042】正常端末300-1、300-2への通信が完了後、サーバ100は、ビジーが解除されている端末300-3に対して未受信データの再送を行う(ステップ106)。図9は、本発明の低性能端末と判定された場合の再送シーケンスを示す。同図において、センタ100からデータを送信した際に、端末300-3からは受信応答がされないため、センタ100は、タイムアウト等により低性能であると判定した場合について説明する。

【0043】サーバ100は応答受信中に端末300-3を低性能端末と判定すると(ステップ201)、サーバ100は当該端末300-3が低性能状態になったことを端末状態管理部106に記録する(ステップ202)。同時に、端末300-3からの否定応答に含まれている未受信パケット番号列を再送管理部104の再送管理テーブル1041に記録する。(否定応答もない場

合は全パケット未受信と記録される。)また、サーバ100は当該端末300-3に対して低性能状態であり、データ転送が中断したことを低性能通知として伝える(ステップ203)。サーバ100は端末300-3の状態をこれ以後、正常端末とは別に管理する。低性能端末の記録後もサーバは正常端末への送信、再送、応答受信等の通信を継続する。

【0044】正常端末への通信が完了後(ステップ204)サーバ100は、端末300-3に対して未受信データの再送を行う(ステップ205)。

【0045】

【実施例】以下に、本発明の実施例を図面と共に説明する。図10は本発明を適用したサーバにおけるデータ再送手順(フローチャート)の例である。最初にビジー端末の扱いに関する実施例である。

【0046】ステップ301) 再送制御部101は、アプリケーション管理部103からデータ送信要求を受けると、当該データ送信用に端末状態管理部106、再送管理部104を初期設定する。

ステップ302) データ構成部105は最初の送信データを構成し、パケット分割して通信制御部102に転送する。通信制御部102は、パケット分割された送信データを正常端末への送信を開始する。以降、正常端末へのデータ送信(送信、再送、応答受信、応答受信待ちを含む)が完了するまで当該ステップの処理を行う。

【0047】ステップ303) 端末状態管理部106は、この間に端末300からビジー通知を受信すると当該端末のビジー状態の記録を行い、ビジー端末を正常端末の状態とは別に管理する。すぐに、正常状態へのデータ送信の処理に戻る。

ステップ304) さらに、サーバ100はビジー解除通知を受けると、端末状態管理部106にビジー解除の記録を行うとともに、ビジー解除通知の未受信パケットの番号に基づいて再送管理部104に端末の未受信パケットの状況を記録する。

【0048】一度ビジー解除通知を発行した端末から再度ビジー通知を受けることも可能であり、この場合には、当該ステップにおいて再度、端末の状態をビジー状態として記録する。正常端末へのデータ送信がすべて完了したときに、ビジー端末への個別再送の処理ステップ305に移る。

【0049】ステップ305) サーバ100は、ステップ304でビジー解除通知を受け取っているビジー端末に対して、再送管理テーブル1041を参照して未受信パケットの再送を行う。ビジー端末への個別再送中においても、再送中の端末を含めビジー解除済みの端末からビジー通知を受けることが可能であり、ステップ306で当該端末の状態をビジー状態として記録する。

【0050】ステップ306) ビジー端末の個別再送中においても、ビジー状態の端末からビジー解除通知を

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受けることが可能である。

ステップ307) 端末からビジー解除通知が通知された場合には、ビジー解除の記録を行うとともに、ビジー解除通知の未受信パケットの番号に基づいて再送管理部104に端末の未受信パケットの状況を記録する。

【0051】ビジー端末への差別再送が終了したときにすべてのデータ送信を終了する。なお、ビジー端末が複数ある場合には、実装上、一つずつ端末への再送処理を行うことができるが、複数のビジー端末への再送を並列に行うこともできる。図11は、本発明の一実施例のビジー端末がある場合のデータ再送の動作を示すシーケンスチャートである。。

【0052】ステップ401) まず、サーバのアプリケーション管理部103から送信用データが再送制御部101に渡されると、再送制御部101では、再送管理部104及び端末状態管理部107を初期設定を行う。データ構成部105は、送信データを取得すると、当該データをパケット分割して、宛先端末のアドレスを付与して、通信制御部102を介して端末A、端末B、端末Cにデータaを送信する。

【0053】ステップ402) ここで、サーバ100は送信データa(パケット番号“1”)に対して、端末Aからは、正常受信の応答があり、端末Bと端末Cからはビジー通知を受信する。

ステップ403) 端末状態管理部106は、再送制御部106を介して、当該端末Bと端末Cがビジーである旨を受け取ると、端末A、Bがビジー状態にあることを記録する。さらに、端末B、Cの状態を再送管理部104に通知すると、再送管理テーブル1041の端末B、Cのデータaの欄に未受信を示す“×”が記録される。30 端末Aの状態を再送管理部104に通知すると、再送管理テーブル1041には、“○”が記録される。

【0054】さらに、サーバ100が端末B、Cビジー通知を受け取ったことにより、端末状態管理部106に、当該端末B、Cがビジー状態にあることを記録する。

ステップ404) 上記のステップ402において、正常受信している正常端末Aに対しては、データ送信を継続し、正常受信している場合にはこの処理を繰り返す。

【0055】ステップ405) サーバ100がビジー状態にある端末Bビジー解除通知を受信する。40

ステップ406) サーバ100は、再送管理部104の再送管理テーブル1041を参照して、当該端末Bに未送信のパケット(再送管理テーブルに×が付与してあるパケット:ここでは、データaとする)を認識し、当該データaを取得して、正常端末Aの送信終了後に、当該端末B1”に対してデータaの再送を行う。

【0056】ステップ407) さらに、ここで、端末Cビジー解除通知を受信する。

ステップ408) サーバ100は、上記のステップ4 50

05と同様の方法で、データaの再送を行う。このように、データの再送を行う場合には、端末のデータ受信、または、未受信の状態を再送管理部104の再送管理テーブル1041において管理し、当該テーブル1041を参照して再送の要否を決定する。また、端末がビジーであるか否かの管理は、端末状態管理部106において行い、例えば、端末300がビジーである場合には、ビット=1とし、端末300からビジー解除通知を受信したらビット=0とする。このビジー解除通知を受信したら、データ再送が可能となるので、再送管理テーブル1041を参照して、サーバ100の都合のよいタイミングを選んで、当該端末300にデータの再送を行うものである。

【0057】次に、低性能と判定された端末に対してデータの再送を行う例を説明する。図12は、本発明の一実施例のサーバから低性能端末へのデータ再送動作のフローチャートである。

ステップ501) 再送制御部101は、アプリケーション管理部103からデータ送信要求を受けると端末状態管理部106、再送管理部104を初期設定する。20

【0058】ステップ502) データ構成部105は最初の送信データを構成し、パケット分割して通信制御部102に転送する。通信制御部102は、パケット分割された送信データを正常端末への送信を開始する。以降、正常端末へのデータ送信(送信、再送、応答受信、応答受信待ちを含む)が完了するまで当該ステップの処理を行う。

【0059】ステップ503) サーバ100は、データ送信に対する端末300からの応答を待機し、端末300から否定応答があった場合に、端末性能判定部107は、再送制御部101から当該否定応答を取得し、応答送信元の端末300の状態を判定する。

【0060】ステップ504) 否定応答を発行した端末が端末性能判定部107において低性能端末と判定された場合には、端末状態管理部106は当該端末が低性能端末である旨を記録する。さらに、通信制御部102を介して当該端末に、低性能扱いとなった旨を通知し、再送が後回しとなったことを伝える。

【0061】ステップ505) また、データを送信した端末300について、n回のタイムアウトを設定し、タイムアウトの回数がn回を越えた時点で低性能と判定する。ここで、低性能と判定された場合には、ステップ506に移行し、それ以外は、ステップ509に移行する。

【0062】ステップ506) タイムアウトとなった端末300については、個別再送可能かを判定する。再送管理部104は、再送管理テーブル1041を参照して、当該端末が全くパケットを受信していなければ、ステップ508に移行し、1つでもパケットを受信していれば(再送管理テーブル内にパケット番号に1つでも○が



ある)、個別再送可能として、ステップ507に移行する。

【0063】ステップ507) ステップ506において、個別再送可能であると判定された場合には、再送管理テーブル1041を参照して、低性能状態のため個別再送することを記録し、当該端末に通知パケットにより個別再送扱いとなったことを通知し、個別再送に備える。

【0064】ステップ508) ステップ506において、当該端末が全くパケットを受信していない場合には、それ以上再送しても効果がないものと判定し、当該端末を再送の対象から除外する。

ステップ509) ステップ505において規定のタイムアウト回数以内であれば、未応答の端末(複数あり得る)に問い合わせパケットを送出し、応答を催促し、応答待ちとなる。

【0065】ステップ510) 正常端末へのデータ送信が完了した時点で、低性能端末への個別再送を行う。上記の低性能端末が存在する場合の動作を説明する。図13は、本発明の一実施例の低性能端末についてのデータ再送動作のシーケンスチャートである。

【0066】ステップ601) サーバ100から端末A、端末B、端末Cにそれぞれデータaを送信する。

ステップ602) 端末A及び端末Bから応答を受信する。これらの応答のうち、端末Aからの応答は、正常受信を示す応答であったが、端末Bからの応答は、否定応答であるとする。これにより、端末状態管理部106は、端末Aを正常端末管理とする。

【0067】ステップ603) サーバ100は、端末Bの応答について、端末性能判定部107において当該否定応答が低性能を示すか否かを判定し、この例では、低性能と判定し、正常端末管理から除外する。従って、端末状態管理部106では、端末Bを異常端末として個別管理とする。

【0068】ステップ604) データ構成部105は、端末Bに図8(D)のパケットにおいて、付加情報として当該端末に対するデータ再送は後回しとなったことを設定し、端末Bに送信する。

ステップ605) この間サーバ100は、正常端末である端末Aにデータb、cを送出する。

【0069】ステップ606) サーバ100は、端末Cのタイムアウトを監視しており、この時点でタイムアウトを検出した。

ステップ607) このタイムアウトの回数は、所定の回数nを越えているため、端末性能判定部107は、当該端末Cにデータを再送しても受信できないと判定し、端末状態管理部106の管理より除外する。

【0070】ステップ608) サーバ100は、データdを正常な端末Aに転送する。

ステップ609) サーバ100は、データaを端末B

に再送する。この例では、低性能端末への個別再送が全て終了した時にデータ送信処理が完了する。

【0071】なお、低性能端末が複数ある場合には、実装上、一つずつ端末への再送処理を行うことができるが、複数の低性能端末への再送を並列に行うこともできる。以上、図10、図12でビジー端末の場合と低性能端末の場合を独立した例として説明したが、両者を合わせた場合も可能である。その場合、個別再送でビジー端末を優先するか、低性能端末を優先するかは任意である。例えば、原則としてビジー端末を先に再送するとして、すべてビジー解除通知待ちのときには低性能端末の再送を行うという実装ができる。

【0072】このように、本実施例によれば、一時的に受信不能(ビジー)となった端末及びデータ受信状況のよくない端末への再送はサーバの都合のよい時に別扱いして行うこととし、大多数の正常端末への送信、再送を優先して行うことが可能である。

【0073】

【発明の効果】上述のように本発明によれば、サーバにおいて、ビジー端末及び低性能端末の状態及び受信状態を記憶し、当該端末の状態を正常端末とは切り分けて管理することにより、正常端末へのデータ送信、再送終了後に当該端末に対して未受信であるデータだけを再送することができる。その結果、ビジー端末及び低性能性端末への無駄なデータの再送を防ぎつつ、正常端末へのデータ送信、再送を優先して、多数端末全体へのデータ転送効率を向上させる。

【図面の簡単な説明】

【図1】本発明の原理を説明するための図である。

【図2】本発明の原理構成図である。

【図3】本発明の適用する情報通信システム構成図である。

【図4】本発明の動作の概要を示す図である。

【図5】本発明のサーバ構成図である。

【図6】本発明の再送管理部が有する再送管理テーブルの例を示す図である。

【図7】本発明の通信パケットの構成例を示す図である。

【図8】本発明のビジー端末と判定された場合のデータ再送のシーケンスを示す図である。

【図9】本発明の低性能端末と判定された場合のデータ再送シーケンスを示す図である。

【図10】本発明の一実施例のサーバからのビジー端末へのデータ再送の動作を示すフローチャートである。

【図11】本発明の一実施例のビジー端末がある場合のデータ再送の動作を示すフローチャートである。

【図12】本発明の一実施例のサーバから低性能端末へのデータ再送動作のフローチャートである。

【図13】本発明の一実施例の低性能端末についてのデータ再送動作のシーケンスチャートである。

【図14】従来の複数端末へのデータ再送シーケンスを示す図である。

【図15】従来のビジー通知によるデータ再送シーケンスを示す図である。

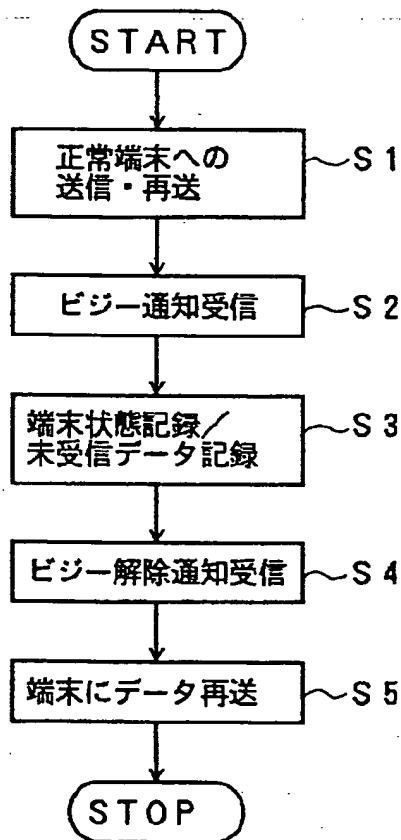
【符号の説明】

- 10 管理手段
- 20 個別管理手段
- 21 再送管理手段
- 22 端末状態管理手段
- 23 第1の低性能判定手段
- 24 第2の低性能判定手段
- 25 除外手段

- 30 送信手段
- 40 正常端末管理手段
- 100 サーバ
- 101 再送制御部
- 102 通信制御部
- 103 アプリケーション管理部
- 104 再送管理部
- 105 データ構成部
- 106 端末状態管理部
- 107 端末性能判定部
- 200 ネットワーク
- 300 端末

【図1】

本発明の原理を説明するための図



【図6】

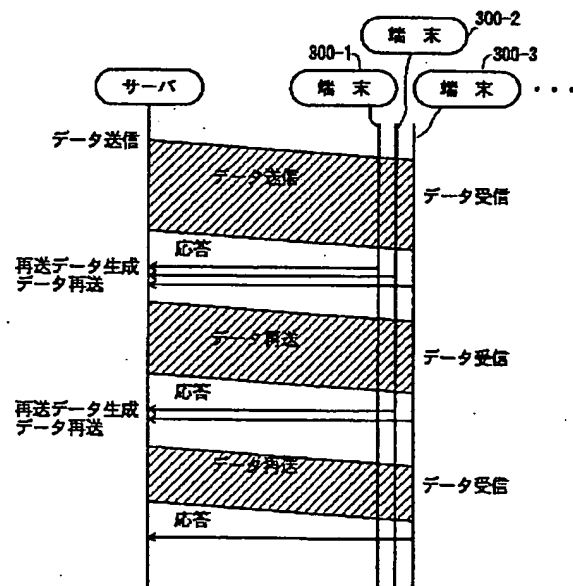
本発明の再送管理部が有する再送管理テーブルの例を示す図

端末ID	パケット番号									
	1	2	3	4	...	...	...	...	...	m
1	x	○	○	○						○
2	○	○	○	x						○
3	x	○	○	x	...					x
...										
n	○	○	○	○						○

○: 受信  
x: 未受信

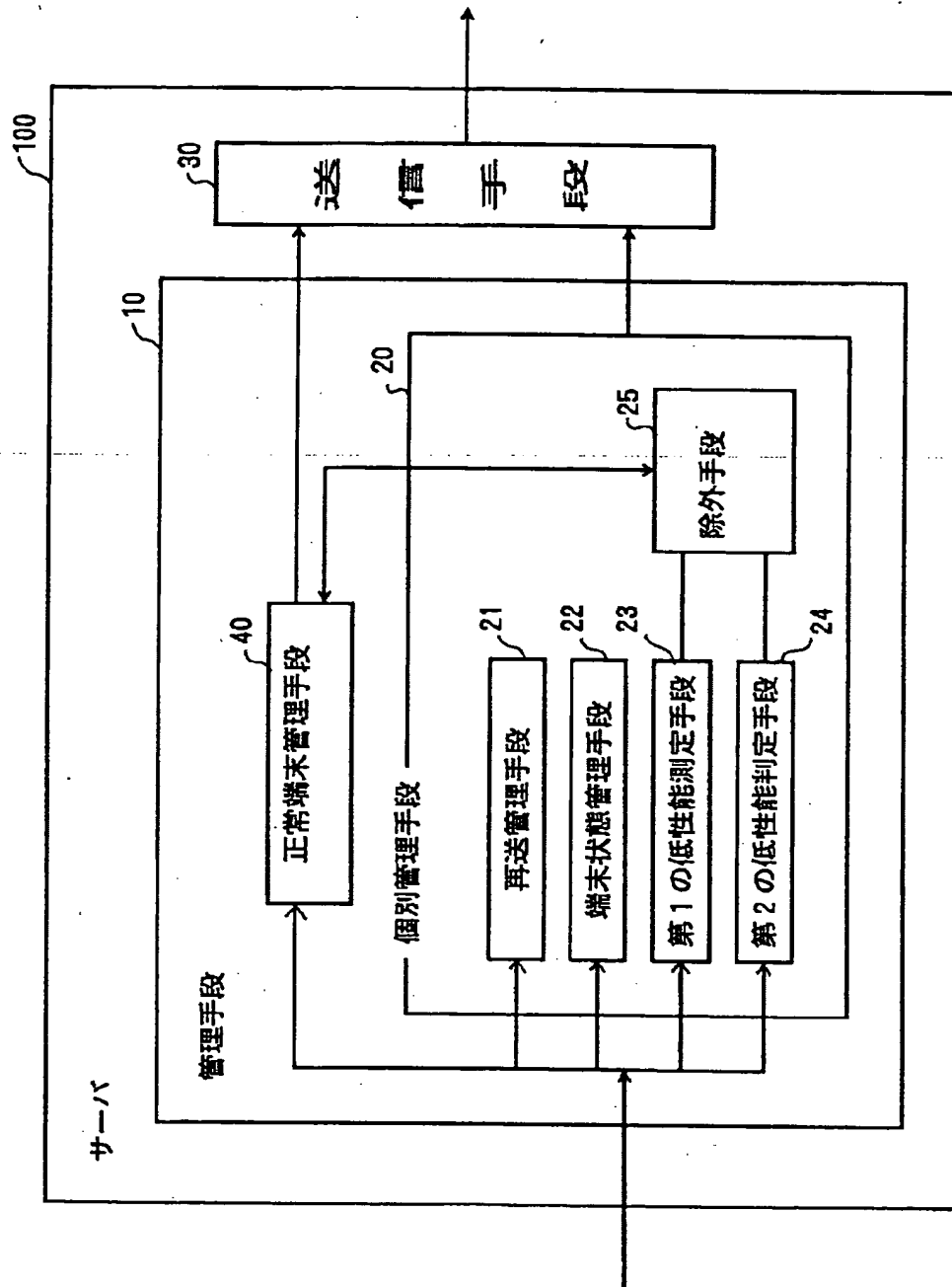
【図14】

従来の複数端末へのデータ再送シーケンスを示す図



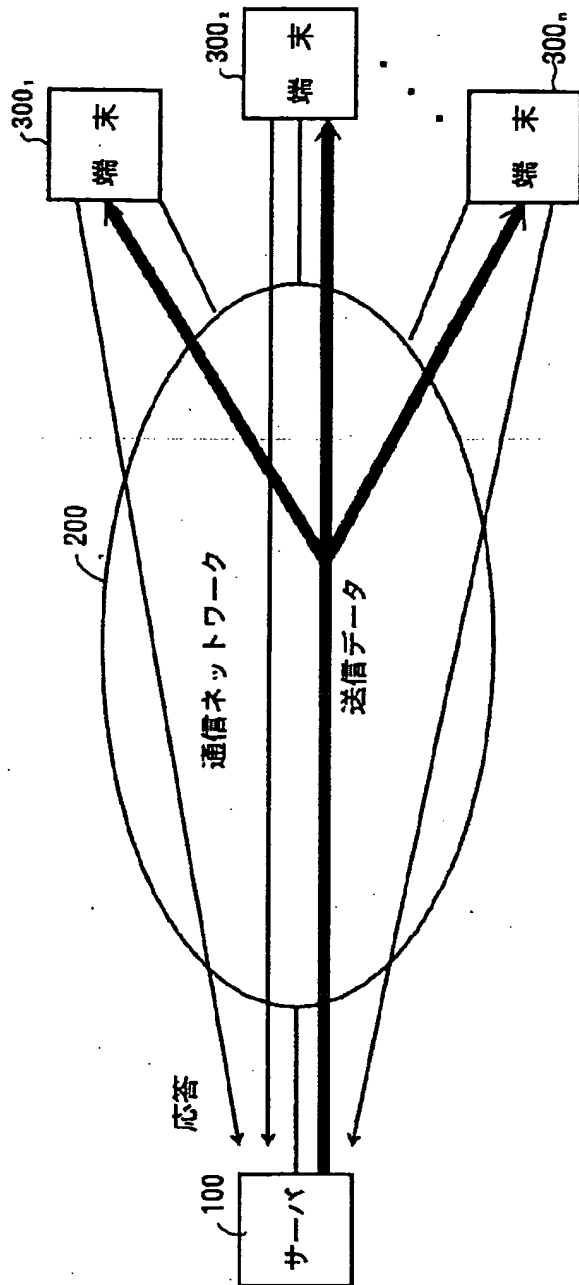
【 図2 】

## 本発明の原理構成図



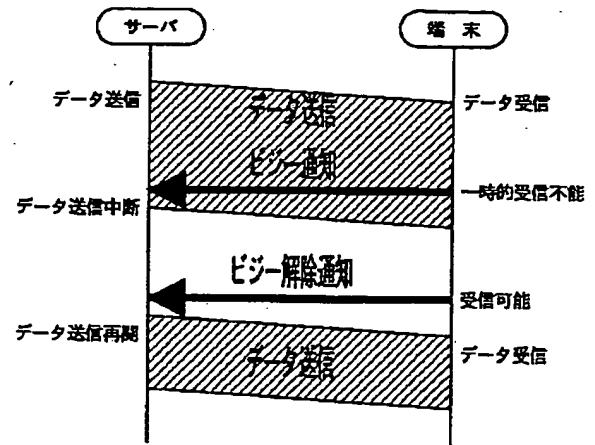
【 図3 】

本発明を適用する情報通信システム構成図

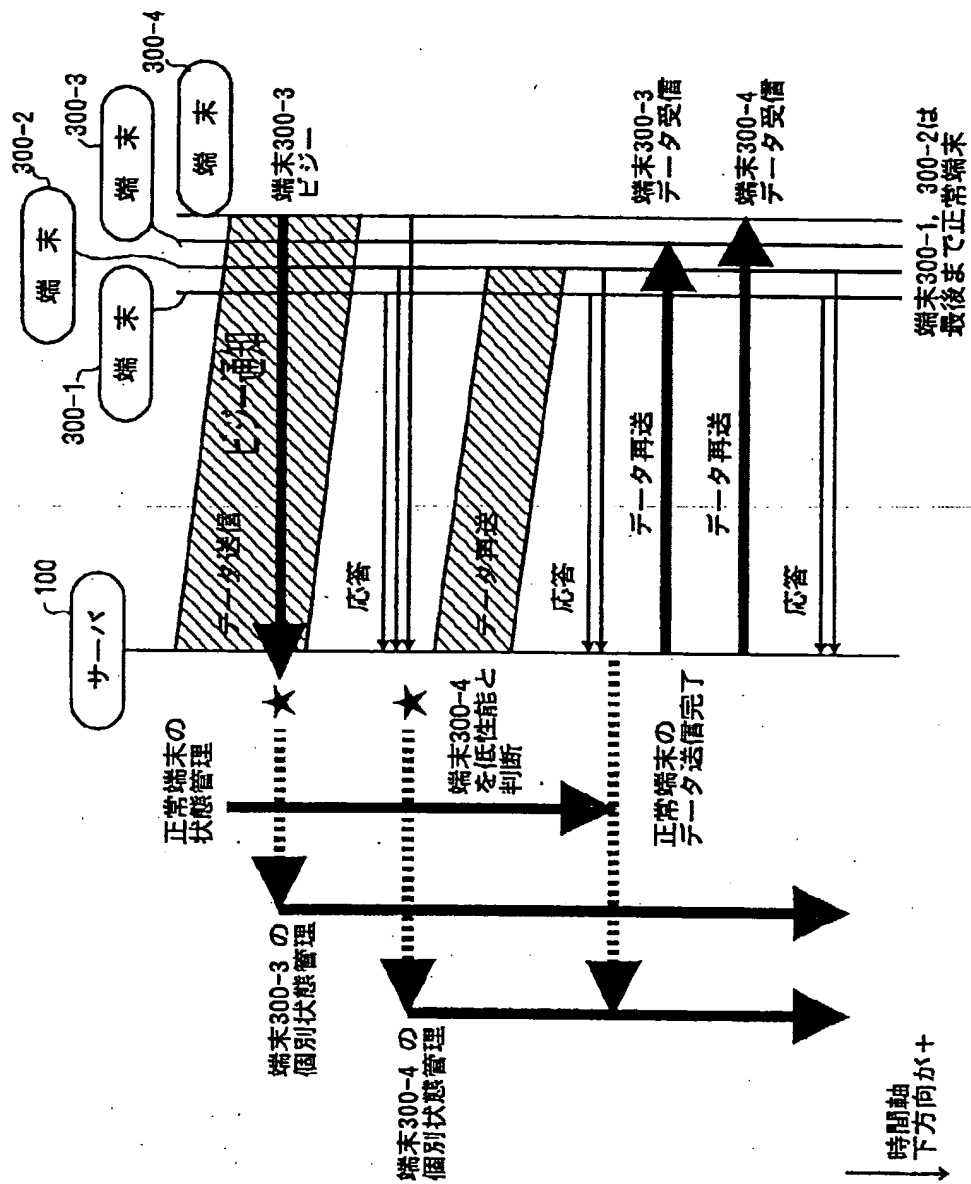


【 図15 】

従来のビジー通知によるデータ再送シーケンス

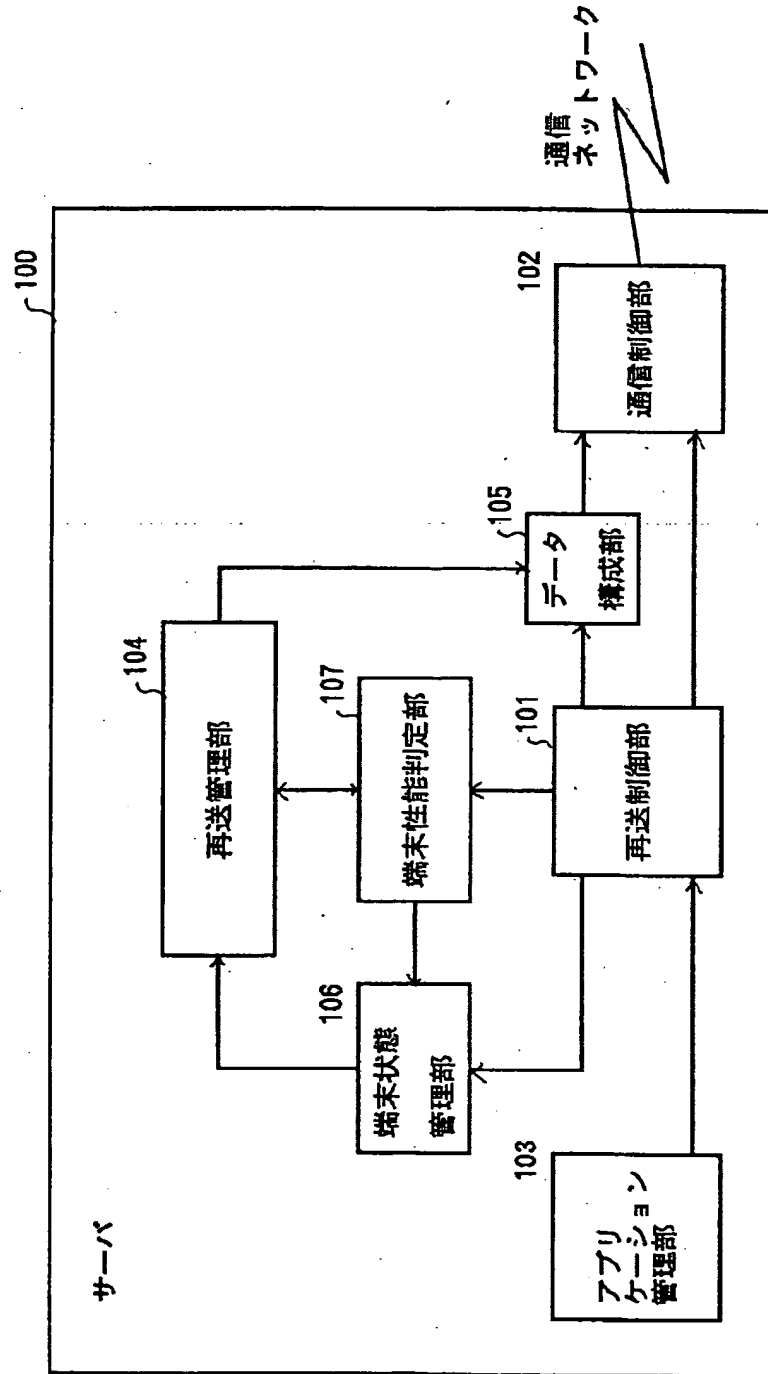


### 本発明の動作の概要を示す図



【 図5 】

本発明のサーバの構成図



【 図7 】

本発明の通信パケットの構成例を示す図

P 0 0 問い合わせ

P 0 1 端末宛先	P 0 2 サーバ宛先	P 0 T パケット種別
---------------	----------------	-----------------

(A)

B 0 0 ビジー通知

B 0 1 サーバ宛先	B 0 2 端末 I D	B 0 T パケット種別
----------------	-----------------	-----------------

(B)

6 0 0 ビジー解除通知

6 0 1 サーバ宛先	6 0 2 端末 I D	6 0 T パケット種別	6 0 3 未受信パケット番号列
----------------	-----------------	-----------------	---------------------

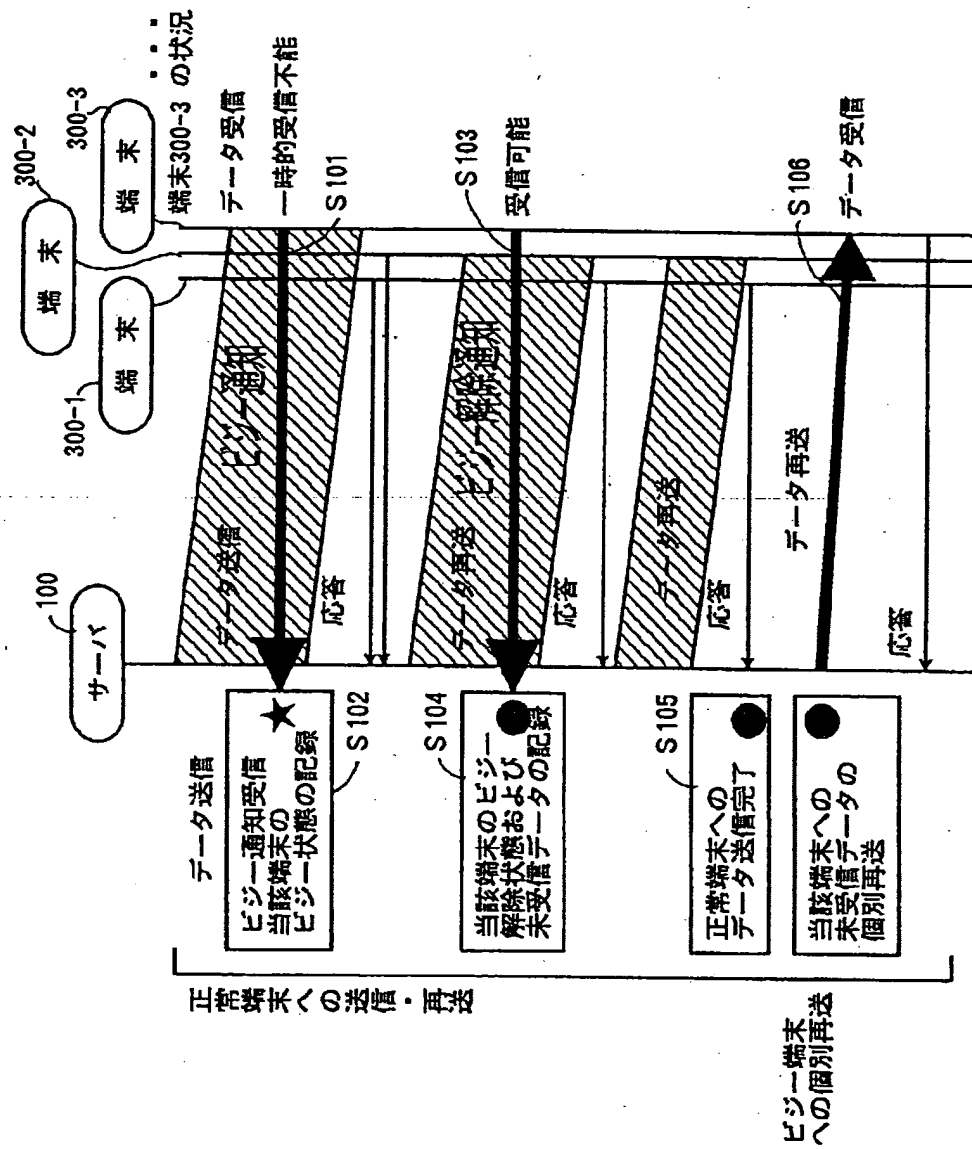
(C)

D 0 0 低性能通知

D 0 1 端末宛先	D 0 2 サーバ宛先	D 0 T パケット種別	D 0 3 付加情報
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(D)

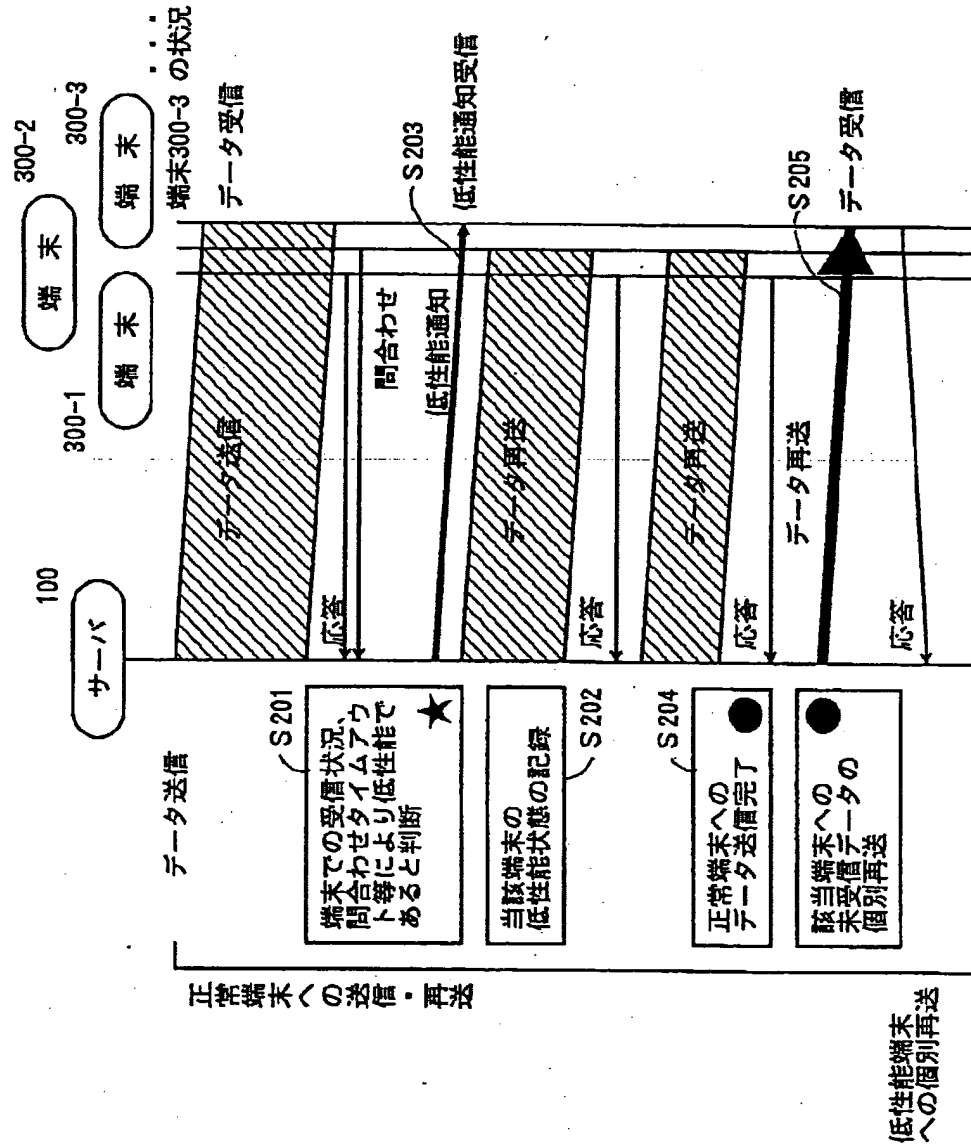
本発明のビジー端末と判定された場合のデータ再送シーケンスを示す図





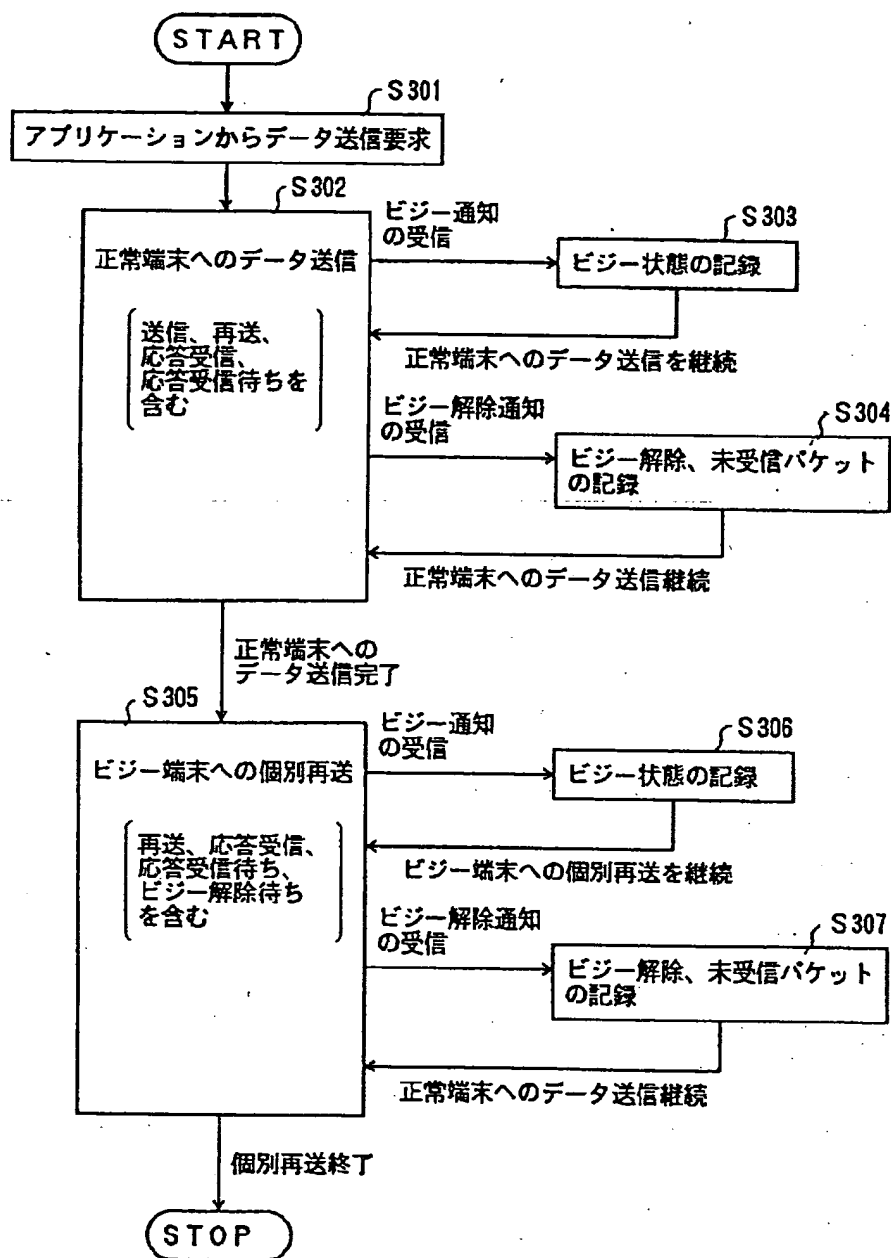
【 図 9 】

本発明の低性能端末と判定された場合のデータ再送シーケンスを示す図



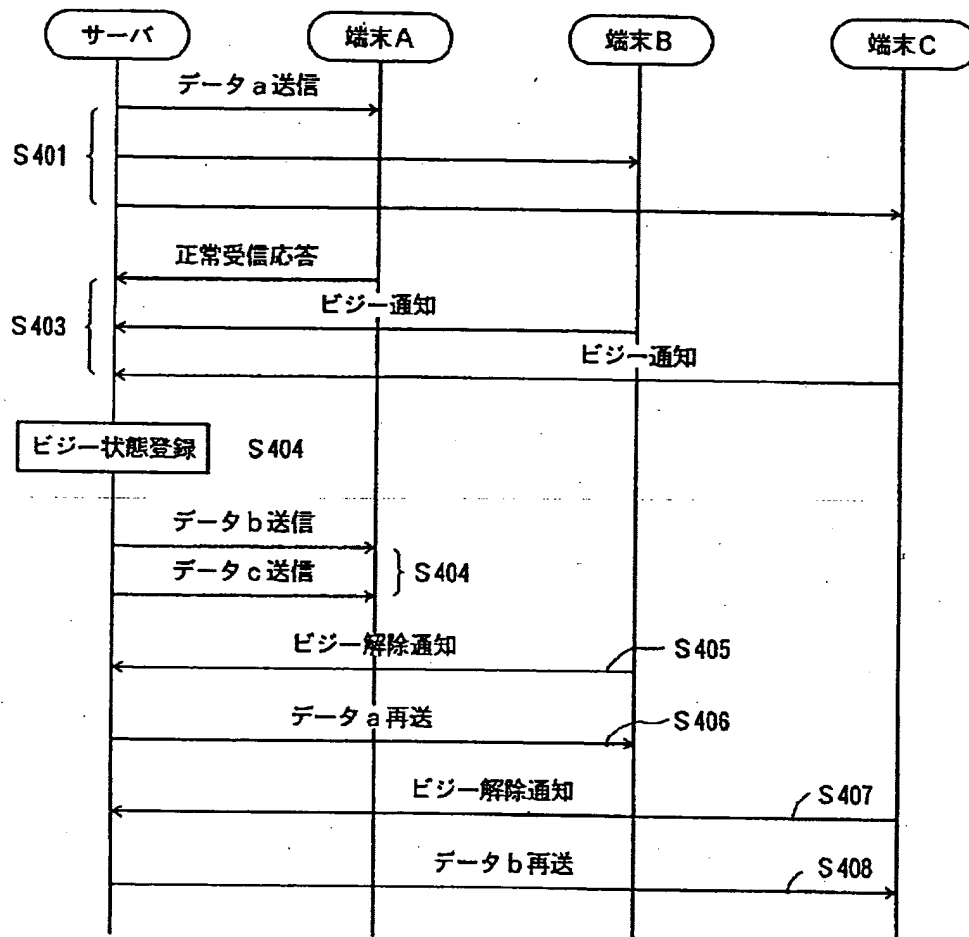
【図10】

本発明の一実施例のサーバからのビジョー端末へのデータ再送の動作のフローチャート



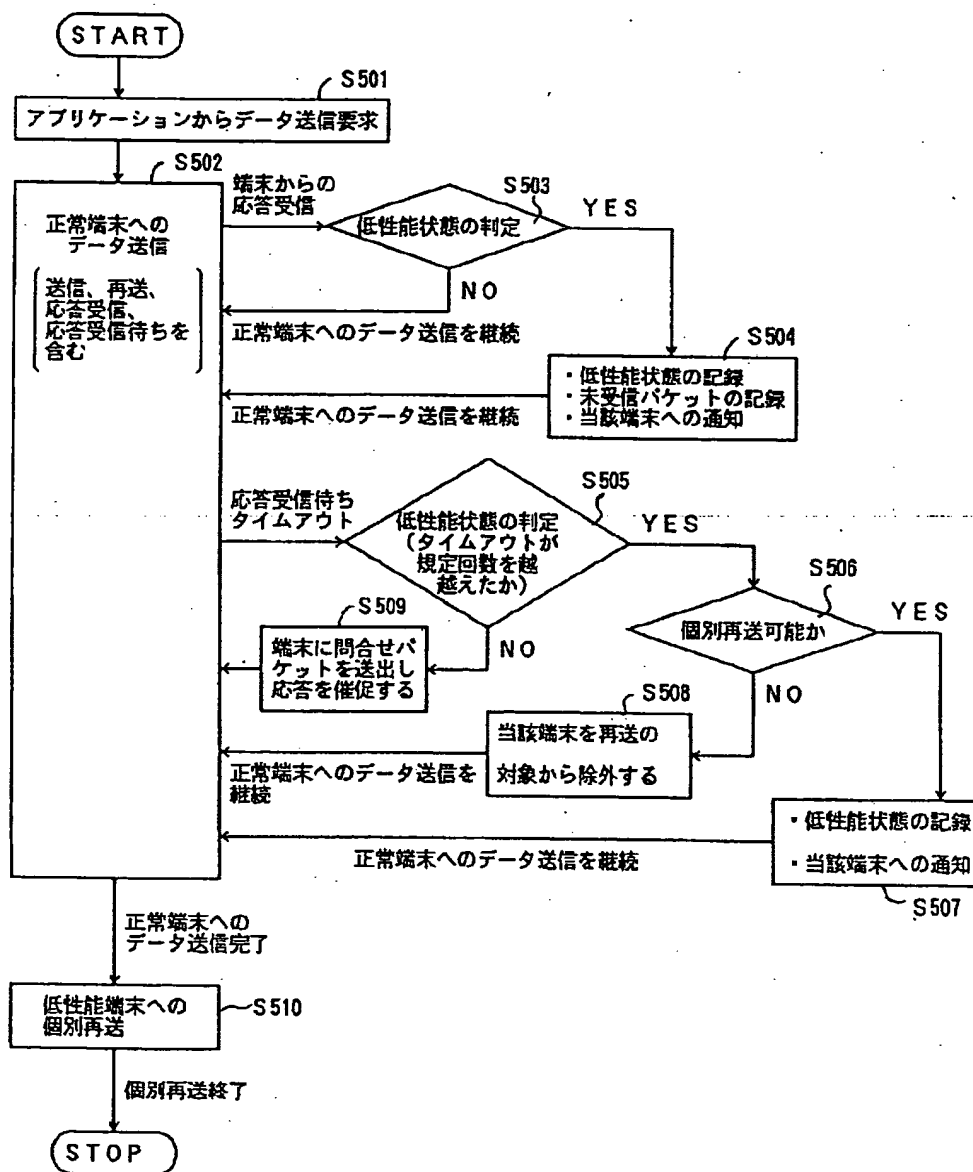
【 図11 】

本発明の一実施例のビジー端末がある場合のデータ再送の動作を示すフローチャート



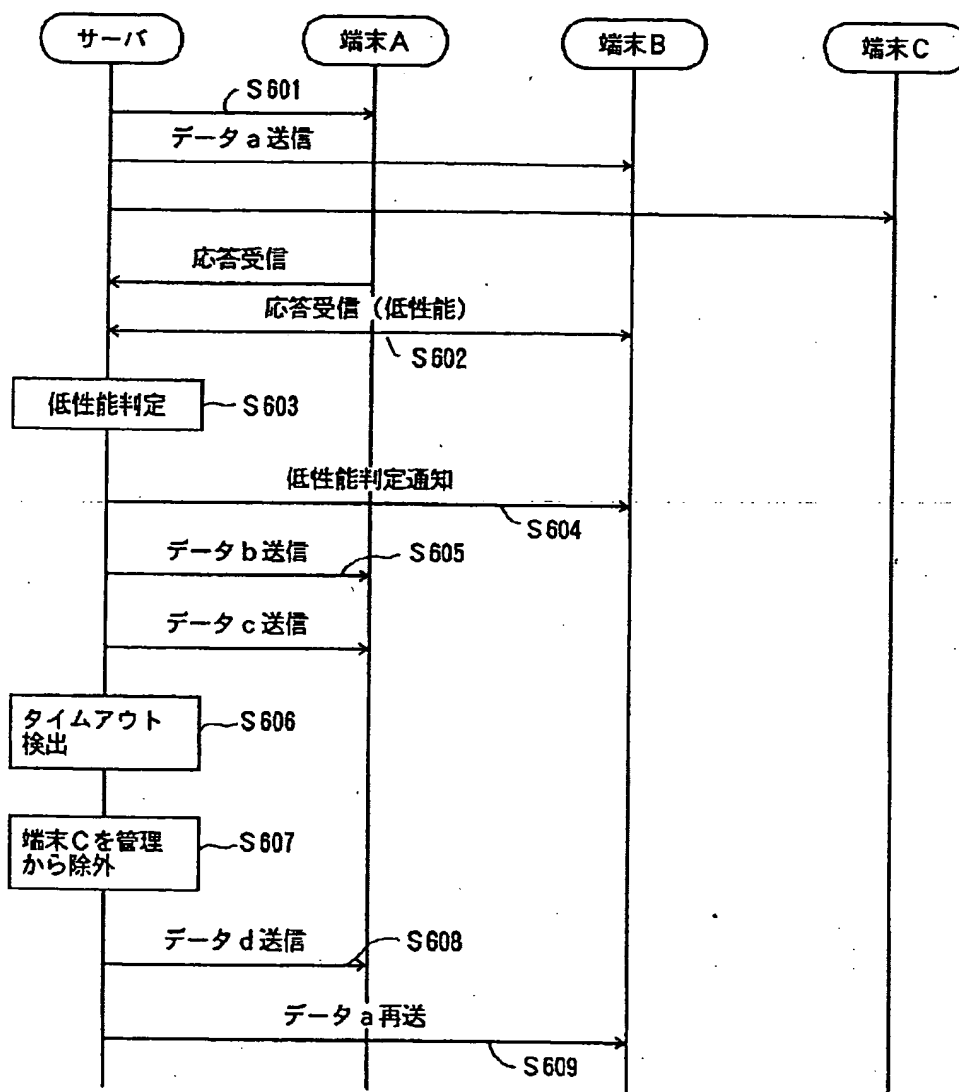
【図12】

本発明の一実施例のサーバから低性能端末へのデータ再送動作のフローチャート



【 図1 3 】

本発明の一実施例の低性能端末についてのデータ再送動作のシーケンスチャート



# PATENT ABSTRACTS OF JAPAN

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<NTT>

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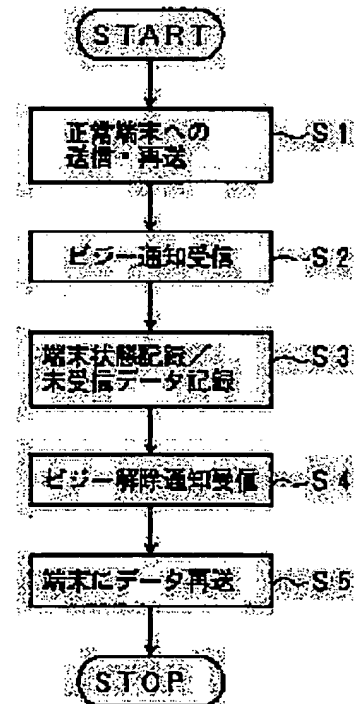
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TAKAHASHI OSAMU  
YAMASHITA MASAhide

## (54) DATA RESENDING METHOD AND SERVER

### (57)Abstract:

PROBLEM TO BE SOLVED: To improve the efficiency of data transfer to all of many terminals by making a server transmit and retransmit data preferentially to many normal terminals and resend only unreceived data to a terminal which becomes busy and a terminal with low receiving performance at server's convenient time.

SOLUTION: This server performs the data transmission and retransmission preferentially to many normal terminals (step 1) and retransmits only the unreceived data to the terminal which becomes busy and the terminal with low receiving performance at server's convenient time (step 2). Further, the server records the states of the terminals and the status of the unreceived data and performs individual state management different from the states of other normal terminals (step 3), and when a busy state reset report showing that reception is enabled is received from the terminal (step 4), the state of the terminal and the status of the unreceived data are referred to, thereby resending the data to the terminal at server's convenient time according to the record.



## LEGAL STATUS

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converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of  
rejection]

[Date of requesting appeal against examiner's  
decision of rejection]

[Date of extinction of right]

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CLAIMS

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[Claim(s)]

[Claim 1] In the data resending approach which resends data again when a server performs data transmission and this terminal cannot receive all the data to two or more terminals connected through a communication network the terminal which said server gave priority to transmission to many normal terminals, and resending, and performed data transmission, and became a busy only about non-received data when the convenience of a server was good, and a terminal with the low receiving engine performance -- resending -- the data resending approach characterized by things.

[Claim 2] Said server is the data resending approach according to claim 1 of performing another status management from the status management table A of the terminal which has received all the data normally in parallel to the state transition of said status management table A corresponding to the terminal which was not able to receive all the data normally which derived two or more status management tables, and followed advance of transmission or.

[Claim 3] When a signal to that effect is received from the terminal with which non-receipt or receiving capacity declined temporarily, said server Freeze transition of the terminal concerned in said status management table A, record this condition, and after that, when the signal of the purport which became ability ready for receiving from the terminal concerned is received The data resending approach according to claim 2 which restores the condition of the terminal concerned, and the situation of non-received data from said condition that freezing record was carried out, and resumes data transmission to the terminal concerned.

[Claim 4] When a signal to that effect is received from the terminal with which non-receipt or receiving capacity declined temporarily, said server Carry out freezing record of the state transition of the terminal concerned in said status management table A, and the status management table B is newly opened. Succeed a condition from said status management table A, perform resending control to said terminal according to said status management table B, and after that, when the signal of the purport which became ability ready for receiving from the terminal concerned is received The data resending approach according to claim 2 which resumes the state transition of said terminal on said status management table A, succeeds the situation of non-received data from the condition of said status management table B in that case, and resumes data transmission to said terminal at it.

[Claim 5] In the server which resends data again when data transmission is performed among two or more terminals connected to a communication network and this terminal cannot receive all the data said server The server characterized by having the management tool which divides transmission to a normal terminal and the status management of resending, and the status management of the terminal which published the notice of a busy, and the terminal judged that the receiving engine performance is low, and performs them, and a transmitting means to perform data transmission to a terminal based on said management tool.

[Claim 6] Said management tool is a server according to claim 5 which has a normal terminal management means to manage the condition of the normal terminal which carried out normal reception of the transmit data, and the individual management tool which manages a busy condition, a busy discharge condition, and a low engine-performance condition according to an individual as a condition of said terminal, respectively.

[Claim 7] Said management tool is a server according to claim 5 which has further a status management shift means to shift management to said individual management tool when the terminal managed with said normal terminal management means changes from an all seems well to an abnormal condition, and to shift to a normal terminal management means when the terminal managed with said individual management tool changes to an all seems well.



[Claim 8] Said individual management tool is a server according to claim 6 which has a terminal status management means to manage a busy thing and to manage that data resending is possible when the notice of busy discharge is received when the notice of a busy was received from the terminal and said notice of a busy is thought to be the resending management tool which memorizes reception and un-receiving from said terminal. [ of the packet in a terminal ]

[Claim 9] The 1st low engine-performance judging means which judges whether this terminal is the low engine performance when said individual management tool has a negative acknowledge to said transmit data from said terminal, The 2nd low engine-performance judging means judged from said terminal to be a low engine-performance terminal when there is no response to said transmit data, and there is no response exceeding the time-out of a predetermined count, The server according to claim 6 which has an exclusion means to except the terminal judged to be the low engine performance from said normal terminal management means in said 1st low engine-performance judging means or said 2nd low engine-performance judging means.

[Claim 10] It is the server according to claim 5 which resends data to the terminal judged that said transmitting means can be transmitted individual among the terminal of the issue origin of the notice of a busy which is made to give priority to data transmission to said normal terminal managed in said normal terminal management means, and is managed by said individual management tool subsequently to [ after completing transmission to said normal terminal ], or said low engine-performance terminal.

[Claim 11] The server according to claim 8 which contains a non-received packet number in said notice of busy discharge.

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[Translation done.]

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the data resending approach and a server, and especially, when a server performs data transmission by a multicast (destination assignment multiple address) etc. to two or more terminals and there are loss and the error of received data, it relates to the data resending approach and server which resend to a terminal from a server.

[0002]

[Description of the Prior Art] In the data communication to which a server generally transmits data to two or more terminals After the server of a transmitting side divides a series of data into the data (it is hereafter called a packet) of suitable magnitude and transmits to two or more terminals, each terminal Returning to a server by making information about acknowledge of normal reception, or non-received data into a negative acknowledge, a server resends a packet to two or more terminals based on these responses again.

[0003] Drawing 14 is drawing showing the data resending sequence to conventional two or more terminals. After a server carries out data transmission to two or more terminals, a response is returned from each terminal, a server generates resending data based on these responses, and having repeated the procedure of performing data resending is shown.

[0004] In this drawing, data transmission is performed from a server to three terminals of terminals 1, 2, and 3. Thereby, the purport of normal reception or abnormality reception is answered from a terminal. Here, since it is only a terminal 1, it resends data to terminals 2 and 3 that there was a normal response as a result of a server's carrying out data transmission at terminals 1, 2, and 3. Here, although there was a response of the purport of normal reception from a terminal 2, since it is the abnormality response from a terminal 3, again, a server generates resending data and resends data for the data concerned to a terminal 3.

[0005] Moreover, in the conventional description, temporarily, with it being non-receipt (busy), when the notice of a busy is transmitted, interruption of data transmission to the busy terminal concerned is required from a server, when it becomes, and the terminal concerned becomes ability ready for receiving, the data resending method with which a terminal transmits the notice of busy discharge has a terminal. Drawing 15 shows the data resending sequence by the conventional notice of a busy. If a server receives the notice of a busy from the terminal (busy terminal) which became non-receipt temporarily during data transmission, data transmission to the terminal concerned is interrupted, and after receiving the notice of busy discharge from the terminal concerned, the procedure which resumes data transmission is shown.

[0006] In this drawing, when a server transmits data to a terminal, since the terminal is busy, it is the example which is in a non-receipt condition temporarily. In this case, since the notice of a busy is published from a terminal even if it transmits data from a server, a server will interrupt data transmission, if this notice of a busy is received. Furthermore, if a terminal changes in the ready-for-receiving ability condition, the notice of busy discharge will be transmitted to a server. Thereby, a server resumes transmission of data to a terminal.

[0007]

[Problem(s) to be Solved by the Invention] However, when the notice of a busy is received from the terminal which has a server when using combining the two above-mentioned conventional methods, if status management is

performed to other normal terminals and EQCs, since data transmission to the normal terminal which are not other busies, and resending will also interrupt this terminal, a server has the problem that the effectiveness of the whole data communication falls remarkably.

[0008] Moreover, in the same situation, if the communication link to the terminal concerned is removed from status management, it is necessary to redo resending to the terminal concerned from the beginning also including data [ finishing / reception ], and the communication link effectiveness to the terminal concerned will fall remarkably. Moreover, in the method of the former of the above-mentioned conventional technique, there is a problem that the data communication effectiveness to the whole terminal falls as it will be dragged by the receiving engine performance of this terminal and the count of resending will increase, if the terminal which is not good as for a data receiving situation is treated to many of other normal terminals and EQCs.

[0009] Moreover, in the same situation, if the communication link to the terminal concerned is removed from status management, it is necessary to redo resending to the terminal concerned from the beginning also including data [ finishing / reception ], and the communication link effectiveness to the terminal concerned will fall remarkably. Especially the above problem manifests itself, when a server performs data resending in the multicast communication link which performs the multiple address to two or more terminals by the transmitting processing which is 1 time.

[0010] When the convenience of a server is good, resending to the terminal which this invention was made in view of the above-mentioned trouble, and gave priority to transmission to many normal terminals, and resending, and became a busy, or a terminal with the low receiving engine performance It aims at offering the data resending approach and server which priority is given to transmission to many normal terminals, and can perform it, making it possible to resend only non-received data to the terminal concerned, and mitigating the resending data to the terminal concerned, without resending data [ finishing / reception ].

[0011]

[Means for Solving the Problem] In the data resending approach that this invention resends data again when a server performs data transmission to two or more terminals connected through a communication network and this terminal cannot receive all the data A server gives priority to transmission to many normal terminals, and resending, performs data transmission (step 1), and when the convenience of a server is good, it resends only non-received data to the terminal used as a busy, or a terminal with the low receiving engine performance (step 2).

[0012] moreover, one or more individuals [ condition / of a normal terminal ] in case this invention performs status management of each terminal in a server -- something unusual -- voice management -- being derived -- the status management of a normal terminal -- being parallel -- an individual -- something unusual -- voice management is also performed. Drawing 1 is drawing for explaining the principle of this invention.

[0013] When the notice of a busy is received from the terminal which became non-receipt temporarily in this invention, a server (Step 2), Record the condition of a terminal, record the condition of a terminal, and the situation of non-received data, and it considers as individual status management with the another condition of other normal terminals (step 3). When the notice of busy discharge which shows that it became ability ready for receiving from the terminal is received, when the convenience of a server is good, with reference to the condition of (step 4) and a terminal, and the situation of non-received data, the data to a terminal are resent based on this record (step 5).

[0014] Moreover, in this invention, when the receiving situation of a terminal is not good, a server makes this terminal individual status management different from the condition of other normal terminals, records the condition of the terminal concerned, and the situation of non-received data, and when convenience of a server is good, it resends the data to the terminal concerned based on record.

[0015] Drawing 2 is the principle block diagram of this invention. In the server 100 which resends data again when this invention performs data transmission among two or more terminals connected to a communication network and this terminal cannot receive all the data A server 100 has the management tool 10 which divides transmission to a normal terminal and the status management of resending, and the status management of the terminal which published the notice of a busy, and the terminal judged that the receiving engine performance is low, and performs them, and a transmitting means 30 to perform data transmission to a terminal based on a management tool 10.

[0016] The above-mentioned management tool 10 has a normal terminal management means 40 to manage the condition of the normal terminal which carried out normal reception of the transmit data, and the individual management tool 20 which manages a busy condition, a busy discharge condition, and a low engine-performance

condition according to an individual, respectively. The above-mentioned management tool 10 shifts management to the individual management tool 20, when the terminal managed with the normal terminal management means 40 changes from an all seems well to an abnormal condition, and when the terminal managed with the individual management tool 20 changes to an all seems well, it has further a status management shift means to shift to the normal terminal management means 40. The above-mentioned individual management tool 20 has the resending management tool 21 which will memorize reception and un-receiving if the notice of a busy is received from a terminal, and a terminal status management means 22 to manage \*\* in which data resending is possible if it manages that it is busy if the notice of a busy is received from a terminal and the notice of busy discharge is received. [ of the packet in a terminal ]

[0017] The 1st low engine-performance judging means 23 which judges whether this terminal is the low engine performance when the above-mentioned individual management tool 20 has a negative acknowledge to transmit data from a terminal, The 2nd low engine-performance judging means 24 judged from a terminal to be a low engine-performance terminal when there is no response to transmit data, and there is no response exceeding the time-out of a predetermined count, In the 1st low engine-performance judging means 23 or the 2nd low engine-performance judging means 24, it has an exclusion means 25 to except the terminal judged to be the low engine performance from the normal terminal management means 40.

[0018] Data are resent to the terminal judged that the above-mentioned transmitting means 30 can be transmitted individual among the terminal of the issue origin of the notice of a busy which is made to give priority to data transmission to the normal terminal managed in the normal terminal management means 40, and is managed by the individual management tool 20 subsequently to [ after completing transmission to a normal terminal ], or a low engine-performance terminal.

[0019] Moreover, the identifier of a non-received packet is included in the notice of busy discharge. It is solved by performing status management apart from a normal terminal by the above to the terminal judged that the terminal and the receiving engine performance which the notice of a busy was received apart from transmission to a normal terminal and the status management of resending in the server 2 are low. Specifically, it is as follows.

[0020] In a server 100, even after judging it after the notice reception of a busy, and as the low engine performance with the time of a terminal status management means 22 to memorize the conditions (a busy condition, a busy discharge condition, a low engine-performance condition, normal state, etc.) of a terminal, and a normal state, the resending management tool 21 which memorizes reception / un-receiving is formed. [ of each packet in the terminal concerned ]

[0021] Moreover, 1st and 2nd low engine-performance judging means 23 and 24 to set 100 to a server and to judge that a terminal is in a low engine-performance condition is established. When the notice of a busy is received from a terminal, a server 100 records that the terminal concerned became a busy on the terminal status management means 22, and holds record of reception / non-receive state of each packet as it is in the resending management tool 21. (The latest receiving situation of the terminal concerned is recorded by the negative acknowledge.) When there is no negative acknowledge, not all packets have received. Thereby, the condition and packet receiving situation of a busy terminal are manageable in distinction from a normal terminal henceforth.

[0022] A server 100 excepts the terminal concerned from a normal terminal, and continues transmission to other terminals, and resending. If a busy terminal takes out the notice of busy discharge to a server when it becomes ability ready for receiving, and a server receives the notice of busy discharge, it will record that busy discharge of the terminal was carried out in the terminal status management means 22. Including the number of a non-receive packet in the notice of busy discharge, the server breaks and holds record of reception / non-receive state of the packet of a resending management tool.

[0023] A server performs data resending to the busy discharge terminal by which busy discharge is carried out with reference to the terminal status management means 22 after transmission to a normal terminal, and resending termination when self convenience is good. About the busy terminal by which busy discharge is not carried out, a server is resent, after waiting until the notice of busy discharge comes. Although waited predetermined time by the timer supervision about the notice waiting of busy discharge in this server, a communication link is closed about the terminal which carried out the time-out.

[0024] In the 1st and 2nd low engine-performance judging means 23 and 24, a server judges the terminal concerned

based on the situation of the negative acknowledge from a terminal, and not answering to be a low engine-performance condition, and records that the terminal concerned became the low engine performance on the terminal status management means 22, and holds record of reception / non-receive state of each packet as it is in the resending management tool 21. (The latest receiving situation of the terminal concerned is recorded by the negative acknowledge.) When there is no negative acknowledge, not all packets have received. Thereby, the condition and packet receiving situation of a low engine-performance terminal are manageable in distinction from a normal terminal henceforth.

[0025] It does not wait vague long time, but especially that of a non-answered time-out is judged with the low engine performance, when it presses for a response, count permission of a convention of the time-out is carried out and this count is exceeded by the inquiry packet. Since it can judge with the low engine performance clearly by this, it judges for a short time rather than it stands by vaguely, and it can change to transmission (it is multicast resending in the case of a multicast) to the normal terminal of the next round, efficient data resending can be performed.

[0026] A server performs data resending to a low engine-performance terminal after transmission to a normal terminal, and termination of resending, when self convenience is good. As for to any priority shall be given between resending to a busy terminal, and resending to a low engine-performance terminal, plans may differ for every system. It is efficient when resending to a low engine-performance terminal is performed at the idle time of the waiting for busy discharge.

[0027] By the above, a server gives priority to data transmission to a normal terminal, and resending, and it can resend only non-received data, without resending data [ finishing / reception ] also to a busy terminal and a low engine-performance terminal. Consequently, it is not necessary to redo resending to a busy terminal and a low engine-performance terminal from the beginning, and the effectiveness of the whole data communication can be raised, without interrupting data transmission to a normal terminal, and resending, or carrying out performance degradation.

[0028]

[Embodiment of the Invention] Hereafter, the example of this invention is explained using a drawing. Drawing 3 shows the information communication link system configuration which applied this invention. The system shown in this drawing consists of a server 100, a communication network 200, and two or more terminals 300. The system of this drawing shows signs that the negative acknowledge which includes the acknowledge or resending information on the confirmation of receipt from each terminal 300 is returned, after a server 100 transmits data to two or more terminals 300.

[0029] Drawing 4 shows the outline of actuation of this invention. In the server, signs that the status management according to individual is derived are shown from the status management of a normal terminal. This drawing shows the system which performs data transmission from a server 100 to four terminals 300-1,300-2,300-3,300-4.

[0030] To the beginning, the individual status management of the terminal 300 concerned is started by the specific event in a server 100. In parallel with management of a normal terminal, one or more individual status management is performed. For example, in drawing 4 , when a server 100 receives the notice of a busy, status management is begun by using the terminal 300-3 concerned as a busy terminal. When a server 100 judges with the low engine performance, the status management as a low engine-performance terminal of the terminal 300-4 concerned starts. In any case, the status management of other normal terminals 300-1,300-2 continues.

[0031] In drawing 4 , if a server 100 performs data transmission to a terminal 300-1,300-2,300-3,300-4, from a terminal 300-1,300-2, a normal notice (notice of the completion of data reception) will be received, and the notice of a busy will be received from a terminal 300-3. At this time, individual status management is performed as a busy terminal to a terminal 300-3. Furthermore, about a terminal 300-4, since individual status management was started since the notice of abnormalities arrived, and the time-out was repeated more than the count of predetermined, it shall judge with the low engine performance and individual status management shall be performed.

[0032] Drawing 5 shows the configuration of the server of this invention. The server 100 shown in this drawing consists of the resending control section 101, the communications control section 102, the application Management Department 103, the resending Management Department 104, the data configuration section 105, the terminal status management section 106, and the terminal engine-performance judging section 107.

[0033] The resending control section 101 performs data communication through the communications control section 102 based on the data Request to Send from the application Management Department 103. Transmit data is constituted

in the data configuration section 105. At the resending Management Department 104, the packet receiving situation (received/distinction which is not received for every terminal of each packet to which the sequence number was attached) of all the terminals 300 is managed on the resending managed table 1041 shown in drawing 6. The receiving situation of a busy terminal is also memorized by this. The resending managed table 1041 can show whether the packet corresponding to a packet number is reception ending (O), or it has not received (x) in each terminal, as shown in drawing 6. A mounting top is realizable when it makes bit-off (0) corresponding to [ x ] corresponding to O for bit-on (1).

[0034] The resending managed table 1041 is used for management of the receiving situation (success or failure of packet reception) of the packet of each terminal for packet resending. The resending managed table 1041 can be shared at a normal terminal and a busy terminal, and a low engine-performance terminal. However, from a viewpoint of processing effectiveness, when the individual status management of a busy terminal or a low engine-performance terminal starts, the line of the table about the terminal concerned can be copied, another table (only line) can be prepared for every terminal, and thereby, the resending situation of each terminal can also be managed. In this case, when individual resending of each terminal (a busy terminal, low engine-performance terminal) is completed, in the original resending managed table, the completion situation of data resending of the whole terminal can be grasped by reporting a result to the original resending managed table.

[0035] In the terminal status management section 106, it manages and memorizes whether it is in which conditions, such as a normal communication link condition, a busy condition, a busy discharge condition, and a low engine-performance condition, for every terminal. This analyzes the contents of the response frame from a terminal 300 through a communication network 200, and recognizes a condition.

[0036] The contents of the communication link frame are shown in drawing 7. This drawing (A) is the frame of the inquiry which transmits from a server 100 to a terminal 300, and is constituted in the terminal destination P01, the server destination P02, and packet classification P0T. The server destination P02 sets up the address of the server of the dispatch origin at the time of an inquiry. Packet classification P0T distinguish the packet classification of the data of an inquiry by the integral value.

[0037] This drawing (B) shows the notice of a busy transmitted from a terminal 300 to a server 100, and consists of the server destination B01, a terminal ID 02, and packet classification B0T. Packet section classification B0T set up the classification of the notice of a busy by the integral value. This drawing (C) shows the notice of busy discharge transmitted from a terminal 300 to a server 100, and consists of the server destination 601, a terminal ID 602, packet classification 60T, and a non-receive-packet number train 603. Packet classification 60T set up the integral value which shows the classification of the notice of busy discharge here.

[0038] This drawing (D) shows the notice of the low engine performance transmitted from a center 100 to a terminal 300, and includes the server destination 601, a terminal ID 602, and the number train 602 of the non-receive packet in the notice sending-out time of busy discharge in each terminal. The number train of a non-receive packet is usually equivalent to the non-receive-packet number train included in a negative acknowledge from a terminal, and includes the numerical train, the suitable range notation, etc. Packet classification D0T set up the integral value which shows the classification of the notice of the low engine performance. Additional information D03 is additional information, such as a stage of individual resending, and the reception preparation of it is beforehand attained by knowing about what time data resending will be resumed in a terminal.

[0039] The terminal engine-performance judging section 107 judges whether based on the response from a terminal 300, the terminal concerned changed into the low engine-performance condition. Based on the situation of the time-out which is not answered [ a negative acknowledge or ], the terminal concerned is judged from a terminal to be a low engine-performance terminal, and the judgment result is notified to the terminal status management section 106. In addition, a non-answered time-out is judged with the low engine performance, when it presses for a response by the inquiry packet and a time-out exceeds the count of a convention.

[0040] Drawing 8 shows the resending sequence at the time of being judged with the busy terminal of this invention. In this drawing, when data are transmitted from a center 100, a terminal 300-3 shall be in a busy condition, and a terminal 300-1, 300-2 presupposes that it is an all seems well. The terminal 300-3 concerned records that the server 100 would be in the busy condition for a server 100 to receive the notice of a busy from a terminal 300-3 during data transmission on the terminal status management section 106 (step 102). (step 101) A server 100 manages the condition

of a terminal 300-3 apart from a normal terminal after this. As for a server, after record of a busy terminal continues the communication link of transmission to a normal terminal, resending, response reception, etc.

[0041] next, a terminal 300-3 to the notice of busy discharge -- receiving (step 103) -- as for a server 100, a terminal 300-3 records having changed into the busy discharge condition on the terminal status management section (step 104). The non-receive-packet number train included in the notice of busy discharge at coincidence is recorded on the resending managed table 1041 of the resending Management Department 104. As for a server 100, after record of busy discharge continues the communication link with the normal terminal 300-1,300-2 (step 105).

[0042] A server 100 resends non-received data to the terminal 300-3 of which the busy is canceled after completing the communication link to the normal terminal 300-1,300-2 (step 106). Drawing 9 shows the resending sequence at the time of being judged with the low engine-performance terminal of this invention. In this drawing, since a reception response is not carried out from a terminal 300-3 when data are transmitted from a center 100, a center 100 explains the case where it judges with it being the low engine performance by a time-out etc.

[0043] The terminal 300-3 concerned records that the server 100 changed into the low engine-performance condition for a server 100 to judge a terminal 300-3 during response reception to be a low engine-performance terminal on the terminal status management section 106 (step 202). (step 201) The non-receive-packet number train included in the negative acknowledge from the terminal 300-3 at coincidence is recorded on the resending managed table 1041 of the resending Management Department 104. (When there is also no negative acknowledge, all packet un-receiving are recorded.) A server 100 is in a low engine-performance condition to the terminal 300-3 concerned, and it tells that data transfer was interrupted as a notice of the low engine performance again (step 203). A server 100 manages the condition of a terminal 300-3 apart from a normal terminal after this. As for a server, after record of a low engine-performance terminal continues the communication link of transmission to a normal terminal, resending, response reception, etc.

[0044] A server 100 resends non-received data to a terminal 300-3 after completing the communication link to a normal terminal (step 204) (step 205).

[0045]

[Example] Below, the example of this invention is explained with a drawing. Drawing 10 is the example of the data resending procedure (flow chart) in the server which applied this invention. It is an example concerning the treatment of a busy terminal to the beginning.

[0046] Step 301 The resending control section 101 will initialize the terminal status management section 106 and the resending Management Department 104 to the data transmission concerned, if a data Request to Send is received from application 0 \*\*\*\* 103.

Step 302 The data configuration section 105 constitutes the first transmit data, carries out packet division and transmits it to the communications control section 102. The communications control section 102 starts transmission to a normal terminal for the transmit data by which packet division was carried out. Henceforth, the step concerned is processed until data transmission (transmission, resending, response reception, and response receiving waiting are included) to a normal terminal is completed.

[0047] Step 303 If the notice of a busy is received from a terminal 300 in the meantime, the terminal status management section 106 will record the busy condition of the terminal concerned, and will manage a busy terminal apart from the condition of a normal terminal. Immediately, it returns to processing of the data transmission to a normal state.

Step 304 Further, a server 100 records the situation of the non-receive packet of a terminal on the resending Management Department 104 based on the number of the non-receive packet of the notice of busy discharge while recording busy discharge on the terminal status management section 106, if the notice of busy discharge is received.

[0048] It is also possible to receive the notice of a busy from the terminal which published the notice of busy discharge once again, and the condition of a terminal is again recorded as a busy condition in the step concerned in this case. When all data transmission to a normal terminal is completed, it moves to the processing step 305 of individual resending to a busy terminal.

[0049] Step 305 A server 100 resends a non-receive packet with reference to the resending managed table 1041 to the busy terminal which has received the notice of busy discharge at step 304. During individual resending to a busy terminal, it is possible to receive the notice of a busy from a terminal [ finishing / busy discharge ] including the



terminal under resending, and the condition of the terminal concerned is recorded as a busy condition at step 306.  
[0050] Step 306 It is possible to receive the notice of busy discharge from the terminal of a busy condition during individual resending of a busy terminal.

Step 307 When the notice of busy discharge is notified from a terminal, while recording busy discharge, based on the number of the non-receive packet of the notice of busy discharge, the situation of the non-receive packet of a terminal is recorded on the resending Management Department 104.

[0051] When discriminating resending to a busy terminal is completed, all data transmission is ended. In addition, on mounting, when there are two or more busy terminals, although every one resending processing to a terminal can be performed, resending to two or more busy terminals can also be performed to juxtaposition. Drawing 11 is a sequence chart which shows actuation of data resending in case there is a busy terminal of one example of this invention. .

[0052] Step 401 First, if the data for transmission are passed to the resending control section 101 from the application Management Department 103 of a server, by the resending control section 101, initial setting will be performed for the resending Management Department 104 and the terminal status management section 107. If transmit data is acquired, the data configuration section 105 will carry out packet division of the data concerned, will give the address of a destination terminal, and will transmit Data a to Terminal A, Terminal B, and Terminal C through the communications control section 102.

[0053] Step 402 Here, to transmit data a (packet number "1"), a server 100 has the response of normal reception from Terminal A, and receives the notice of a busy from Terminal B and Terminal C.

Step 403 The terminal status management section 106 will record that Terminals A and B are in a busy condition, if the purport that Terminal B and Terminal C concerned are busy is received through the resending control section 106. Furthermore, if the resending Management Department 104 is notified of the condition of Terminals B and C, "x" which shows un-receiving will be recorded on the column of the data a of the terminals B and C of the resending managed table 1041. If the resending Management Department 104 is notified of the condition of Terminal A, "O" will be recorded on the resending Management Department table 1041.

[0054] Furthermore, when the server 100 received Terminal B and the notice of C busy, it records that the terminals B and C concerned are in a busy condition on the terminal status management section 106.

Step 404 In the above-mentioned step 402, when normal reception of the data transmission is being continued and carried out to the normal terminal A which is carrying out normal reception, this processing is repeated.

[0055] Step 405 A server 100 receives the notice of terminal B busy discharge in a busy condition.

Step 406 With reference to the resending managed table 1041 of the resending Management Department 104, a server 100 recognizes the packet (the packet which has given x to the resending managed table: here, consider as Data a) which is not transmitted to the terminal B concerned, acquires the data a concerned, and resends Data a to the terminal B1" concerned after transmitting termination of the normal terminal A.

[0056] Step 407 The notice of terminal C busy discharge is received further here.

Step 408 A server 100 is the same approach as the above-mentioned step 405, and resends Data a. Thus, in resending data, the condition of data reception of a terminal or not receiving is managed in the resending managed table 1041 of the resending Management Department 104, and it determines the necessity of resending with reference to the table 1041 concerned. Moreover, management with a busy terminal is performed in the terminal status management section 106, for example, when a terminal 300 is busy, it is referred to as bit =1, and it will be referred to as bit =0 if the notice of busy discharge is received from a terminal 300. If this notice of busy discharge is received, since data resending will be attained, with reference to the resending managed table 1041, timing with the sufficient convenience of a server 100 is chosen, and data are resent to the terminal 300 concerned.

[0057] Next, the example which resends data to the terminal judged to be the low engine performance is explained. Drawing 12 is the flow chart of the data resending actuation to a low engine-performance terminal from the server of one example of this invention.

step 501 the resending control section 101 -- an application -- if a data Request to Send is received from the KESHI Management Department 103, the terminal status management section 106 and the resending Management Department 104 will be initialized.

[0058] Step 502 The data configuration section 105 constitutes the first transmit data, carries out packet division and transmits it to the communications control section 102. The communications control section 102 starts transmission to



a normal terminal for the transmit data by which packet division was carried out. Henceforth, the step concerned is processed until data transmission (transmission, resending, response reception, and response receiving waiting are included) to a normal terminal is completed.

[0059] Step 503 The terminal engine-performance judging section 107 acquires the negative acknowledge concerned from the resending control section 101, and a server 100 judges the condition of the terminal 300 of response transmitting origin, when the response from the terminal 300 over data transmission is stood by and a negative acknowledge occurs from a terminal 300.

[0060] Step 504 When the terminal which published the negative acknowledge is judged in the terminal engine-performance judging section 107 to be a low engine-performance terminal, the terminal status management section 106 records the purport whose terminal concerned is a low engine-performance terminal. Furthermore, through the communications control section 102, the purport used as low engine-performance treatment is notified to the terminal concerned, and it tells that resending became deferment to it.

[0061] Step 505 When n times of time-outs are set up and the count of a time-out exceeds n times again about the terminal 300 which transmitted data, it judges with the low engine performance. Here, when judged with the low engine performance, it shifts to step 506 and shifts to step 509 except it.

[0062] Step 506 About the terminal 300 used as a time-out, it judges whether individual resending is possible. The resending Management Department 104 will shift to step 508, if the terminal concerned completely comes to have received the packet with reference to the resending managed table 1041, and if at least one packet is received (at least one O is in a packet number in a resending managed table), it will shift to step 507 as individual resending being possible.

[0063] Step 507 In step 506, when judged with individual resending being possible, with reference to the resending managed table 1041, it records carrying out individual resending for a low engine-performance condition, notifies having become the terminal concerned with individual resending treatment by the notice packet, and prepares for individual resending.

[0064] Step 508 In step 506, when the terminal concerned has not received the packet at all, even if it resends more than it, it judges with that ineffective, and the terminal concerned is excepted from the object of resending.

Step 509 If it is less than a regular timeout count in step 505, it will ask a non-answered terminal (there may be more than one), a packet will be sent out, and it will press for a response, and will become the waiting for a response.

[0065] Step 510 When data transmission to a normal terminal is completed, individual resending to a low engine-performance terminal is performed. Actuation in case the above-mentioned low engine-performance terminal exists is explained. Drawing 1313 is the sequence chart of the data resending actuation about the low engine-performance terminal of one example of this invention.

[0066] Step 601 Data a are transmitted to Terminal A, Terminal B, and Terminal C from a server 100, respectively. Step 602 A response is received from Terminal A and Terminal B. Although the response from Terminal A was a response which shows normal reception among these responses, suppose that it is the response from Terminal B a negative acknowledge. Thereby, the terminal status management section 106 makes Terminal A normal terminal management.

[0067] Step 603 A server 100 judges, in this example, judges whether in the terminal engine-performance judging section 107, the negative acknowledge concerned shows the low engine performance about the response of Terminal B to be the low engine performance, and excepts it from normal terminal management. Therefore, in the terminal status management section 106, Terminal B is considered as individual management as an abnormality terminal.

[0068] Step 604 The data configuration section 105 sets it as Terminal B that data resending to the terminal concerned became deferment as additional information in the packet of drawing 8 (D), and transmits to Terminal B.

Step 605 A server 100 sends out Data b and c to the terminal A which is a normal terminal in the meantime.

[0069] Step 606 The server 100 was supervising the time-out of Terminal C, and detected the time-out at this time.

Step 607 Since the count of this time-out is over the predetermined count n, the terminal engine-performance judging section 107 judges with it being unreceivable even if it resends data to the terminal C concerned, and is excepted from management of the terminal status management section 106.

[0070] Step 608 A server 100 transmits Data d to the normal terminal A.

Step 609 A server 100 resends Data a to Terminal B. In this example, when all individual resendings to a low engine-

performance terminal are completed, data transmitting processing is completed.

[0071] In addition, on mounting, when there are two or more low engine-performance terminals, although every one resending processing to a terminal can be performed, resending to two or more low engine-performance terminals can also be performed to juxtaposition. As mentioned above, although drawing 10 and drawing 12 explained the case of a busy terminal, and the case of a low engine-performance terminal as an independent example, it is possible also when both are doubled. In that case, it is arbitrary whether priority is given to a busy terminal by individual resending or priority is given to a low engine-performance terminal. For example, at the time of the waiting for the notice of busy discharge, mounting of resending a low engine-performance terminal can be altogether performed noting that a busy terminal is resent previously in principle.

[0072] Thus, according to this example, it is temporarily possible that it is non-receipt (busy) and for resending to the terminal which became, and the terminal which is not good as for a data receiving situation to decide to carry out by another treatment, when the convenience of a server is good, and to carry out by giving priority to transmission to a large majority of normal terminals and resending.

[0073]

[Effect of the Invention] according to this invention, in a server, resending only the data which have not been received to the terminal concerned after data transmission to a normal terminal and resending termination cuts by memorizing the condition and receive state of a busy terminal and a low engine-performance terminal, carving the condition of the terminal concerned with a normal terminal, and managing it as mentioned above. Consequently, preventing resending of the useless data to a busy terminal and a low engine-performance nature terminal, priority is given to data transmission to a normal terminal, and resending, and the data transmission efficiency to the whole a large number terminal is raised.

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[Translation done.]

**\* NOTICES \***

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**TECHNICAL FIELD**

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[Field of the Invention] This invention relates to the data resending approach and a server, and especially, when a server performs data transmission by a multicast (destination assignment multiple address) etc. to two or more terminals and there are loss and the error of received data, it relates to the data resending approach and server which resend to a terminal from a server.

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[Translation done.]

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**PRIOR ART**

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[Description of the Prior Art] In the data communication to which a server generally transmits data to two or more terminals After the server of a transmitting side divides a series of data into the data (it is hereafter called a packet) of suitable magnitude and transmits to two or more terminals, each terminal Returning to a server by making information about acknowledge of normal reception, or non-received data into a negative acknowledge, a server resends a packet to two or more terminals based on these responses again.

[0003] Drawing 14 is drawing showing the data resending sequence to conventional two or more terminals. After a server carries out data transmission to two or more terminals, a response is returned from each terminal, a server generates resending data based on these responses, and having repeated the procedure of performing data resending is shown.

[0004] In this drawing, data transmission is performed from a server to three terminals of terminals 1, 2, and 3. Thereby, the purport of normal reception or abnormality reception is answered from a terminal. Here, since it is only a terminal 1, it resends data to terminals 2 and 3 that there was a normal response as a result of a server's carrying out data transmission at terminals 1, 2, and 3. Here, although there was a response of the purport of normal reception from a terminal 2, since it is the abnormality response from a terminal 3, again, a server generates resending data and resends data for the data concerned to a terminal 3.

[0005] Moreover, in the conventional description, temporarily, with it being non-receipt (busy), when the notice of a busy is transmitted, interruption of data transmission to the busy terminal concerned is required from a server, when it becomes, and the terminal concerned becomes ability ready for receiving, the data resending method with which a terminal transmits the notice of busy discharge has a terminal. Drawing 15 shows the data resending sequence by the conventional notice of a busy. If a server receives the notice of a busy from the terminal (busy terminal) which became non-receipt temporarily during data transmission, data transmission to the terminal concerned is interrupted, and after receiving the notice of busy discharge from the terminal concerned, the procedure which resumes data transmission is shown.

[0006] In this drawing, when a server transmits data to a terminal, since the terminal is busy, it is the example which is in a non-receipt condition temporarily. In this case, since the notice of a busy is published from a terminal even if it transmits data from a server, a server will interrupt data transmission, if this notice of a busy is received. Furthermore, if a terminal changes in the ready-for-receiving ability condition, the notice of busy discharge will be transmitted to a server. Thereby, a server resumes transmission of data to a terminal.

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[Translation done.]

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] according to this invention, in a server, resending only the data which have not been received to the terminal concerned after data transmission to a normal terminal and resending termination cuts by memorizing the condition and receive state of a busy terminal and a low engine-performance terminal, carving the condition of the terminal concerned with a normal terminal, and managing it as mentioned above. Consequently, preventing resending of the useless data to a busy terminal and a low engine-performance nature terminal, priority is given to data transmission to a normal terminal, and resending, and the data transmission efficiency to the whole a large number terminal is raised.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, when the notice of a busy is received from the terminal which has a server when using combining the two above-mentioned conventional methods, if status management is performed to other normal terminals and EQCs, since data transmission to the normal terminal which are not other busies, and resending will also interrupt this terminal, a server has the problem that the effectiveness of the whole data communication falls remarkably.

[0008] Moreover, in the same situation, if the communication link to the terminal concerned is removed from status management, it is necessary to redo resending to the terminal concerned from the beginning also including data [ finishing / reception ], and the communication link effectiveness to the terminal concerned will fall remarkably. Moreover, in the method of the former of the above-mentioned conventional technique, there is a problem that the data communication effectiveness to the whole terminal falls as it will be dragged by the receiving engine performance of this terminal and the count of resending will increase, if the terminal which is not good as for a data receiving situation is treated to many of other normal terminals and EQCs.

[0009] Moreover, in the same situation, if the communication link to the terminal concerned is removed from status management, it is necessary to redo resending to the terminal concerned from the beginning also including data [ finishing / reception ], and the communication link effectiveness to the terminal concerned will fall remarkably. Especially the above problem manifests itself, when a server performs data resending in the multicast communication link which performs the multiple address to two or more terminals by the transmitting processing which is 1 time.

[0010] When the convenience of a server is good, resending to the terminal which this invention was made in view of the above-mentioned trouble, and gave priority to transmission to many normal terminals, and resending, and became a busy, or a terminal with the low receiving engine performance It aims at offering the data resending approach and server which priority is given to transmission to many normal terminals, and can perform it, making it possible to resend only non-received data to the terminal concerned, and mitigating the resending data to the terminal concerned, without resending data [ finishing / reception ].

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## MEANS

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[Means for Solving the Problem] In the data resending approach that this invention resends data again when a server performs data transmission to two or more terminals connected through a communication network and this terminal cannot receive all the data A server gives priority to transmission to many normal terminals, and resending, performs data transmission (step 1), and when the convenience of a server is good, it resends only non-received data to the terminal used as a busy, or a terminal with the low receiving engine performance (step 2).

[0012] moreover, one or more individuals [ condition / of a normal terminal ] in case this invention performs status management of each terminal in a server -- something unusual -- voice management -- being derived -- the status management of a normal terminal -- being parallel -- an individual -- something unusual -- voice management is also performed. Drawing 1 is drawing for explaining the principle of this invention.

[0013] When the notice of a busy is received from the terminal which became non-receipt temporarily in this invention, a server (Step 2), Record the condition of a terminal, record the condition of a terminal, and the situation of non-received data, and it considers as individual status management with the another condition of other normal terminals (step 3). When the notice of busy discharge which shows that it became ability ready for receiving from the terminal is received, when the convenience of a server is good, with reference to the condition of (step 4) and a terminal, and the situation of non-received data, the data to a terminal are resent based on this record (step 5).

[0014] Moreover, in this invention, when the receiving situation of a terminal is not good, a server makes this terminal individual status management different from the condition of other normal terminals, records the condition of the terminal concerned, and the situation of non-received data, and when convenience of a server is good, it resends the data to the terminal concerned based on record.

[0015] Drawing 2 is the principle block diagram of this invention. In the server 100 which resends data again when this invention performs data transmission among two or more terminals connected to a communication network and this terminal cannot receive all the data A server 100 has the management tool 10 which divides transmission to a normal terminal and the status management of resending, and the status management of the terminal which published the notice of a busy, and the terminal judged that the receiving engine performance is low, and performs them, and a transmitting means 30 to perform data transmission to a terminal based on a management tool 10.

[0016] The above-mentioned management tool 10 has a normal terminal management means 40 to manage the condition of the normal terminal which carried out normal reception of the transmit data, and the individual management tool 20 which manages a busy condition, a busy discharge condition, and a low engine-performance condition according to an individual, respectively. The above-mentioned management tool 10 shifts management to the individual management tool 20, when the terminal managed with the normal terminal management means 40 changes from an all seems well to an abnormal condition, and when the terminal managed with the individual management tool 20 changes to an all seems well, it has further a status management shift means to shift to the normal terminal management means 40. The above-mentioned individual management tool 20 has the resending management tool 21 which will memorize reception and un-receiving if the notice of a busy is received from a terminal, and a terminal status management means 22 to manage \*\* in which data resending is possible if it manages that it is busy if the notice of a busy is received from a terminal and the notice of busy discharge is received. [ of the packet in a terminal ]

[0017] The 1st low engine-performance judging means 23 which judges whether this terminal is the low engine

performance when the above-mentioned individual management tool 20 has a negative acknowledge to transmit data from a terminal, The 2nd low engine-performance judging means 24 judged from a terminal to be a low engine-performance terminal when there is no response to transmit data, and there is no response exceeding the time-out of a predetermined count, In the 1st low engine-performance judging means 23 or the 2nd low engine-performance judging means 24, it has an exclusion means 25 to except the terminal judged to be the low engine performance from the normal terminal management means 40.

[0018] Data are resent to the terminal judged that the above-mentioned transmitting means 30 can be transmitted individual among the terminal of the issue origin of the notice of a busy which is made to give priority to data transmission to the normal terminal managed in the normal terminal management means 40, and is managed by the individual management tool 20 subsequently to [ after completing transmission to a normal terminal ], or a low engine-performance terminal.

[0019] Moreover, the identifier of a non-received packet is included in the notice of busy discharge. It is solved by performing status management apart from a normal terminal by the above to the terminal judged that the terminal and the receiving engine performance which the notice of a busy was received apart from transmission to a normal terminal and the status management of resending in the server 2 are low. Specifically, it is as follows.

[0020] In a server 100, even after judging it after the notice reception of a busy, and as the low engine performance with the time of a terminal status management means 22 to memorize the conditions (a busy condition, a busy discharge condition, a low engine-performance condition, normal state, etc.) of a terminal, and a normal state, the resending management tool 21 which memorizes reception / un-receiving is formed. [ of each packet in the terminal concerned ]

[0021] Moreover, 1st and 2nd low engine-performance judging means 23 and 24 to set 100 to a server and to judge that a terminal is in a low engine-performance condition is established. When the notice of a busy is received from a terminal, a server 100 records that the terminal concerned became a busy on the terminal status management means 22, and holds record of reception / non-receive state of each packet as it is in the resending management tool 21. (The latest receiving situation of the terminal concerned is recorded by the negative acknowledge.) When there is no negative acknowledge, not all packets have received. Thereby, the condition and packet receiving situation of a busy terminal are manageable in distinction from a normal terminal henceforth.

[0022] A server 100 excepts the terminal concerned from a normal terminal, and continues transmission to other terminals, and resending. If a busy terminal takes out the notice of busy discharge to a server when it becomes ability ready for receiving, and a server receives the notice of busy discharge, it will record that busy discharge of the terminal was carried out in the terminal status management means 22. Including the number of a non-receive packet in the notice of busy discharge, the server breaks and holds record of reception / non-receive state of the packet of a resending management tool.

[0023] A server performs data resending to the busy discharge terminal by which busy discharge is carried out with reference to the terminal status management means 22 after transmission to a normal terminal, and resending termination when self convenience is good. About the busy terminal by which busy discharge is not carried out, a server is resent, after waiting until the notice of busy discharge comes. Although waited predetermined time by the timer supervision about the notice waiting of busy discharge in this server, a communication link is closed about the terminal which carried out the time-out.

[0024] In the 1st and 2nd low engine-performance judging means 23 and 24, a server judges the terminal concerned based on the situation of the negative acknowledge from a terminal, and not answering to be a low engine-performance condition, and records that the terminal concerned became the low engine performance on the terminal status management means 22, and holds record of reception / non-receive state of each packet as it is in the resending management tool 21. (The latest receiving situation of the terminal concerned is recorded by the negative acknowledge.) When there is no negative acknowledge, not all packets have received. Thereby, the condition and packet receiving situation of a low engine-performance terminal are manageable in distinction from a normal terminal henceforth.

[0025] It does not wait vague long time, but especially that of a non-answered time-out is judged with the low engine performance, when it presses for a response, count permission of a convention of the time-out is carried out and this count is exceeded by the inquiry packet. Since it can judge with the low engine performance clearly by this, it judges



for a short time rather than it stands by vaguely, and it can change to transmission (it is multicast resending in the case of a multicast) to the normal terminal of the next round, efficient data resending can be performed.

[0026] A server performs data resending to a low engine-performance terminal after transmission to a normal terminal, and termination of resending, when self convenience is good. As for to any priority shall be given between resending to a busy terminal, and resending to a low engine-performance terminal, plans may differ for every system. It is efficient when resending to a low engine-performance terminal is performed at the idle time of the waiting for busy discharge.

[0027] By the above, a server gives priority to data transmission to a normal terminal, and resending, and it can resend only non-received data, without resending data [ finishing / reception ] also to a busy terminal and a low engine-performance terminal. Consequently, it is not necessary to redo resending to a busy terminal and a low engine-performance terminal from the beginning, and the effectiveness of the whole data communication can be raised, without interrupting data transmission to a normal terminal, and resending, or carrying out performance degradation.

[0028]

[Embodiment of the Invention] Hereafter, the example of this invention is explained using a drawing. Drawing 3 shows the information communication link system configuration which applied this invention. The system shown in this drawing consists of a server 100, a communication network 200, and two or more terminals 300. The system of this drawing shows signs that the negative acknowledge which includes the acknowledge or resending information on the confirmation of receipt from each terminal 300 is returned, after a server 100 transmits data to two or more terminals 300.

[0029] Drawing 4 shows the outline of actuation of this invention. In the server, signs that the status management according to individual is derived are shown from the status management of a normal terminal. This drawing shows the system which performs data transmission from a server 100 to four terminals 300-1,300-2,300-3,300-4.

[0030] To the beginning, the individual status management of the terminal 300 concerned is started by the specific event in a server 100. In parallel with management of a normal terminal, one or more individual status management is performed. For example, in drawing 4 , when a server 100 receives the notice of a busy, status management is begun by using the terminal 300-3 concerned as a busy terminal. When a server 100 judges with the low engine performance, the status management as a low engine-performance terminal of the terminal 300-4 concerned starts. In any case, the status management of other normal terminals 300-1,300-2 continues.

[0031] In drawing 4 , if a server 100 performs data transmission to a terminal 300-1,300-2,300-3,300-4, from a terminal 300-1,300-2, a normal notice (notice of the completion of data reception) will be received, and the notice of a busy will be received from a terminal 300-3. At this time, individual status management is performed as a busy terminal to a terminal 300-3. Furthermore, about a terminal 300-4, since individual status management was started since the notice of abnormalities arrived, and the time-out was repeated more than the count of predetermined, it shall judge with the low engine performance and individual status management shall be performed.

[0032] Drawing 5 shows the configuration of the server of this invention. The server 100 shown in this drawing consists of the resending control section 101, the communications control section 102, the application Management Department 103, the resending Management Department 104, the data configuration section 105, the terminal status management section 106, and the terminal engine-performance judging section 107.

[0033] The resending control section 101 performs data communication through the communications control section 102 based on the data Request to Send from the application Management Department 103. Transmit data is constituted in the data configuration section 105. At the resending Management Department 104, the packet receiving situation (received/distinction which is not received for every terminal of each packet to which the sequence number was attached) of all the terminals 300 is managed on the resending managed table 1041 shown in drawing 6 . The receiving situation of a busy terminal is also memorized by this. The resending managed table 1041 can show whether the packet corresponding to a packet number is reception ending (O), or it has not received (x) in each terminal, as shown in drawing 6 . A mounting top is realizable when it makes bit-off (0) corresponding to [ x ] corresponding to O for bit-on (1).

[0034] The resending managed table 1041 is used for management of the receiving situation (success or failure of packet reception) of the packet of each terminal for packet resending. The resending managed table 1041 can be shared at a normal terminal and a busy terminal, and a low engine-performance terminal. However, from a viewpoint of

processing effectiveness, when the individual status management of a busy terminal or a low engine-performance terminal starts, the line of the table about the terminal concerned can be copied, another table (only line) can be prepared for every terminal, and thereby, the resending situation of each terminal can also be managed. In this case, when individual resending of each terminal (a busy terminal, low engine-performance terminal) is completed, in the original resending managed table, the completion situation of data resending of the whole terminal can be grasped by reporting a result to the original resending managed table.

[0035] In the terminal status management section 106, it manages and memorizes whether it is in which conditions, such as a normal communication link condition, a busy condition, a busy discharge condition, and a low engine-performance condition, for every terminal. This analyzes the contents of the response frame from a terminal 300 through a communication network 200, and recognizes a condition.

[0036] The contents of the communication link frame are shown in drawing 7. This drawing (A) is the frame of the inquiry which transmits from a server 100 to a terminal 300, and is constituted in the terminal destination P01, the server destination P02, and packet classification P0T. The server destination P02 sets up the address of the server of the dispatch origin at the time of an inquiry. Packet classification P0T distinguish the packet classification of the data of an inquiry by the integral value.

[0037] This drawing (B) shows the notice of a busy transmitted from a terminal 300 to a server 100, and consists of the server destination B01, a terminal ID 02, and packet classification B0T. Packet section classification B0T set up the classification of the notice of a busy by the integral value. This drawing (C) shows the notice of busy discharge transmitted from a terminal 300 to a server 100, and consists of the server destination 601, a terminal ID 602, packet classification 60T, and a non-receive-packet number train 603. Packet classification 60T set up the integral value which shows the classification of the notice of busy discharge here.

[0038] This drawing (D) shows the notice of the low engine performance transmitted from a center 100 to a terminal 300, and includes the server destination 601, a terminal ID 602, and the number train 602 of the non-receive packet in the notice sending-out time of busy discharge in each terminal. The number train of a non-receive packet is usually equivalent to the non-receive-packet number train included in a negative acknowledge from a terminal, and includes the numerical train, the suitable range notation, etc. Packet classification D0T set up the integral value which shows the classification of the notice of the low engine performance. Additional information D03 is additional information, such as a stage of individual resending, and the reception preparation of it is beforehand attained by knowing about what time data resending will be resumed in a terminal.

[0039] The terminal engine-performance judging section 107 judges whether based on the response from a terminal 300, the terminal concerned changed into the low engine-performance condition. Based on the situation of the time-out which is not answered [ a negative acknowledge or ], the terminal concerned is judged from a terminal to be a low engine-performance terminal, and the judgment result is notified to the terminal status management section 106. In addition, a non-answered time-out is judged with the low engine performance, when it presses for a response by the inquiry packet and a time-out exceeds the count of a convention.

[0040] Drawing 8 shows the resending sequence at the time of being judged with the busy terminal of this invention. In this drawing, when data are transmitted from a center 100, a terminal 300-3 shall be in a busy condition, and a terminal 300-1,300-2 presupposes that it is an all seems well. The terminal 300-3 concerned records that the server 100 would be in the busy condition for a server 100 to receive the notice of a busy from a terminal 300-3 during data transmission on the terminal status management section 106 (step 102). (step 101) A server 100 manages the condition of a terminal 300-3 apart from a normal terminal after this. As for a server, after record of a busy terminal continues the communication link of transmission to a normal terminal, resending, response reception, etc.

[0041] next, a terminal 300-3 to the notice of busy discharge -- receiving (step 103) -- as for a server 100, a terminal 300-3 records having changed into the busy discharge condition on the terminal status management section (step 104). The non-receive-packet number train included in the notice of busy discharge at coincidence is recorded on the resending managed table 1041 of the resending Management Department 104. As for a server 100, after record of busy discharge continues the communication link with the normal terminal 300-1,300-2 (step 105).

[0042] A server 100 resends non-received data to the terminal 300-3 of which the busy is canceled after completing the communication link to the normal terminal 300-1,300-2 (step 106). Drawing 9 shows the resending sequence at the time of being judged with the low engine-performance terminal of this invention. In this drawing, since a reception

response is not carried out from a terminal 300-3 when data are transmitted from a center 100, a center 100 explains the case where it judges with it being the low engine performance by a time-out etc.

[0043] The terminal 300-3 concerned records that the server 100 changed into the low engine-performance condition for a server 100 to judge a terminal 300-3 during response reception to be a low engine-performance terminal on the terminal status management section 106 (step 202). (step 201) The non-receive-packet number train included in the negative acknowledge from the terminal 300-3 at coincidence is recorded on the resending managed table 1041 of the resending Management Department 104. (When there is also no negative acknowledge, all packet un-receiving are recorded.) A server 100 is in a low engine-performance condition to the terminal 300-3 concerned, and it tells that data transfer was interrupted as a notice of the low engine performance again (step 203). A server 100 manages the condition of a terminal 300-3 apart from a normal terminal after this. As for a server, after record of a low engine-performance terminal continues the communication link of transmission to a normal terminal, resending, response reception, etc.

[0044] A server 100 resends non-received data to a terminal 300-3 after completing the communication link to a normal terminal (step 204) (step 205).

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## EXAMPLE

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[Example] Below, the example of this invention is explained with a drawing. Drawing 10 is the example of the data resending procedure (flow chart) in the server which applied this invention. It is an example concerning the treatment of a busy terminal to the beginning.

[0046] Step 301 The resending control section 101 will initialize the terminal status management section 106 and the resending Management Department 104 to the data transmission concerned, if a data Request to Send is received from application 0 \*\*\*\* 103.

Step 302 The data configuration section 105 constitutes the first transmit data, carries out packet division and transmits it to the communications control section 102. The communications control section 102 starts transmission to a normal terminal for the transmit data by which packet division was carried out. Henceforth, the step concerned is processed until data transmission (transmission, resending, response reception, and response receiving waiting are included) to a normal terminal is completed.

[0047] Step 303 If the notice of a busy is received from a terminal 300 in the meantime, the terminal status management section 106 will record the busy condition of the terminal concerned, and will manage a busy terminal apart from the condition of a normal terminal. Immediately, it returns to processing of the data transmission to a normal state.

Step 304 Further, a server 100 records the situation of the non-receive packet of a terminal on the resending Management Department 104 based on the number of the non-receive packet of the notice of busy discharge while recording busy discharge on the terminal status management section 106, if the notice of busy discharge is received.

[0048] It is also possible to receive the notice of a busy from the terminal which published the notice of busy discharge once again, and the condition of a terminal is again recorded as a busy condition in the step concerned in this case. When all data transmission to a normal terminal is completed, it moves to the processing step 305 of individual resending to a busy terminal.

[0049] Step 305 A server 100 resends a non-receive packet with reference to the resending managed table 1041 to the busy terminal which has received the notice of busy discharge at step 304. During individual resending to a busy terminal, it is possible to receive the notice of a busy from a terminal [ finishing / busy discharge ] including the terminal under resending, and the condition of the terminal concerned is recorded as a busy condition at step 306.

[0050] Step 306 It is possible to receive the notice of busy discharge from the terminal of a busy condition during individual resending of a busy terminal.

Step 307 When the notice of busy discharge is notified from a terminal, while recording busy discharge, based on the number of the non-receive packet of the notice of busy discharge, the situation of the non-receive packet of a terminal is recorded on the resending Management Department 104.

[0051] When discriminating resending to a busy terminal is completed, all data transmission is ended. In addition, on mounting, when there are two or more busy terminals, although every one resending processing to a terminal can be performed, resending to two or more busy terminals can also be performed to juxtaposition. Drawing 11 is a sequence chart which shows actuation of data resending in case there is a busy terminal of one example of this invention. .

[0052] Step 401 First, if the data for transmission are passed to the resending control section 101 from the application Management Department 103 of a server, by the resending control section 101, initial setting will be performed for the resending Management Department 104 and the terminal status management section 107. If transmit data is acquired,

the data configuration section 105 will carry out packet division of the data concerned, will give the address of a destination terminal, and will transmit Data a to Terminal A, Terminal B, and Terminal C through the communications control section 102.

[0053] Step 402 Here, to transmit data a (packet number "1"), a server 100 has the response of normal reception from Terminal A, and receives the notice of a busy from Terminal B and Terminal C.

Step 403 The terminal status management section 106 will record that Terminals A and B are in a busy condition, if the purport that Terminal B and Terminal C concerned are busy is received through the resending control section 106. Furthermore, if the resending Management Department 104 is notified of the condition of Terminals B and C, "x" which shows un-receiving will be recorded on the column of the data a of the terminals B and C of the resending managed table 1041. If the resending Management Department 104 is notified of the condition of Terminal A, "O" will be recorded on the resending Management Department table 1041.

[0054] Furthermore, when the server 100 received Terminal B and the notice of C busy, it records that the terminals B and C concerned are in a busy condition on the terminal status management section 106.

Step 404 In the above-mentioned step 402, when normal reception of the data transmission is being continued and carried out to the normal terminal A which is carrying out normal reception, this processing is repeated.

[0055] Step 405 A server 100 receives the notice of terminal B busy discharge in a busy condition.

Step 406 With reference to the resending managed table 1041 of the resending Management Department 104, a server 100 recognizes the packet (the packet which has given x to the resending managed table: here, consider as Data a) which is not transmitted to the terminal B concerned, acquires the data a concerned, and resends Data a to the terminal B1" concerned after transmitting termination of the normal terminal A.

[0056] Step 407 The notice of terminal C busy discharge is received further here.

Step 408 A server 100 is the same approach as the above-mentioned step 405, and resends Data a. Thus, in resending data, the condition of data reception of a terminal or not receiving is managed in the resending managed table 1041 of the resending Management Department 104, and it determines the necessity of resending with reference to the table 1041 concerned. Moreover, management with a busy terminal is performed in the terminal status management section 106, for example, when a terminal 300 is busy, it is referred to as bit =1, and it will be referred to as bit =0 if the notice of busy discharge is received from a terminal 300. If this notice of busy discharge is received, since data resending will be attained, with reference to the resending managed table 1041, timing with the sufficient convenience of a server 100 is chosen, and data are resent to the terminal 300 concerned.

[0057] Next, the example which resends data to the terminal judged to be the low engine performance is explained.

Drawing 12 is the flow chart of the data resending actuation to a low engine-performance terminal from the server of one example of this invention.

step 501 the resending control section 101 -- an application -- if a data Request to Send is received from the KESHI Management Department 103, the terminal status management section 106 and the resending Management Department 104 will be initialized.

[0058] Step 502 The data configuration section 105 constitutes the first transmit data, carries out packet division and transmits it to the communications control section 102. The communications control section 102 starts transmission to a normal terminal for the transmit data by which packet division was carried out. Henceforth, the step concerned is processed until data transmission (transmission, resending, response reception, and response receiving waiting are included) to a normal terminal is completed.

[0059] Step 503 The terminal engine-performance judging section 107 acquires the negative acknowledge concerned from the resending control section 101, and a server 100 judges the condition of the terminal 300 of response transmitting origin, when the response from the terminal 300 over data transmission is stood by and a negative acknowledge occurs from a terminal 300.

[0060] Step 504 When the terminal which published the negative acknowledge is judged in the terminal engine-performance judging section 107 to be a low engine-performance terminal, the terminal status management section 106 records the purport whose terminal concerned is a low engine-performance terminal. Furthermore, through the communications control section 102, the purport used as low engine-performance treatment is notified to the terminal concerned, and it tells that resending became deferment to it.

[0061] Step 505 When n times of time-outs are set up and the count of a time-out exceeds n times again about the

terminal 300 which transmitted data, it judges with the low engine performance. Here, when judged with the low engine performance, it shifts to step 506 and shifts to step 509 except it.

[0062] Step 506 About the terminal 300 used as a time-out, it judges whether individual resending is possible. The resending Management Department 104 will shift to step 508, if the terminal concerned completely comes to have received the packet with reference to the resending managed table 1041, and if at least one packet is received (at least one O is in a packet number in a resending managed table), it will shift to step 507 as individual resending being possible.

[0063] Step 507 In step 506, when judged with individual resending being possible, with reference to the resending managed table 1041, it records carrying out individual resending for a low engine-performance condition, notifies having become the terminal concerned with individual resending treatment by the notice packet, and prepares for individual resending.

[0064] Step 508 In step 506, when the terminal concerned has not received the packet at all, even if it resends more than it, it judges with that ineffective, and the terminal concerned is excepted from the object of resending.

Step 509 If it is less than a regular timeout count in step 505, it will ask a non-answered terminal (there may be more than one), a packet will be sent out, and it will press for a response, and will become the waiting for a response.

[0065] Step 510 When data transmission to a normal terminal is completed, individual resending to a low engine-performance terminal is performed. Actuation in case the above-mentioned low engine-performance terminal exists is explained. Drawing 1313 is the sequence chart of the data resending actuation about the low engine-performance terminal of one example of this invention.

[0066] Step 601 Data a are transmitted to Terminal A, Terminal B, and Terminal C from a server 100, respectively.

Step 602 A response is received from Terminal A and Terminal B. Although the response from Terminal A was a response which shows normal reception among these responses, suppose that it is the response from Terminal B a negative acknowledge. Thereby, the terminal status management section 106 makes Terminal A normal terminal management.

[0067] Step 603 A server 100 judges, in this example, judges whether in the terminal engine-performance judging section 107, the negative acknowledge concerned shows the low engine performance about the response of Terminal B to be the low engine performance, and excepts it from normal terminal management. Therefore, in the terminal status management section 106, Terminal B is considered as individual management as an abnormality terminal.

[0068] Step 604 The data configuration section 105 sets it as Terminal B that data resending to the terminal concerned became deferment as additional information in the packet of drawing 8 (D), and transmits to Terminal B.

Step 605 A server 100 sends out Data b and c to the terminal A which is a normal terminal in the meantime.

[0069] Step 606 The server 100 was supervising the time-out of Terminal C, and detected the time-out at this time.

Step 607 Since the count of this time-out is over the predetermined count n, the terminal engine-performance judging section 107 judges with it being unreceivable even if it resends data to the terminal C concerned, and is excepted from management of the terminal status management section 106.

[0070] Step 608 A server 100 transmits Data d to the normal terminal A.

Step 609 A server 100 resends Data a to Terminal B. In this example, when all individual resendings to a low engine-performance terminal are completed, data transmitting processing is completed.

[0071] In addition, on mounting, when there are two or more low engine-performance terminals, although every one resending processing to a terminal can be performed, resending to two or more low engine-performance terminals can also be performed to juxtaposition. As mentioned above, although drawing 10 and drawing 12 explained the case of a busy terminal, and the case of a low engine-performance terminal as an independent example, it is possible also when both are doubled. In that case, it is arbitrary whether priority is given to a busy terminal by individual resending or priority is given to a low engine-performance terminal. For example, at the time of the waiting for the notice of busy discharge, mounting of resending a low engine-performance terminal can be altogether performed noting that a busy terminal is resent previously in principle.

[0072] Thus, according to this example, it is temporarily possible that it is non-receipt (busy) and for resending to the terminal which became, and the terminal which is not good as for a data receiving situation to decide to carry out by another treatment, when the convenience of a server is good, and to carry out by giving priority to transmission to a large majority of normal terminals and resending.

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[Translation done.]

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is drawing for explaining the principle of this invention.

[Drawing 2] It is the principle block diagram of this invention.

[Drawing 3] It is the information communication link system configuration Fig. which this invention applies.

[Drawing 4] It is drawing showing the outline of actuation of this invention.

[Drawing 5] It is the server block diagram of this invention.

[Drawing 6] It is drawing showing the example of the resending managed table which the resending Management Department of this invention has.

[Drawing 7] It is drawing showing the example of a configuration of the communication link packet of this invention.

[Drawing 8] It is drawing showing the sequence of data resending at the time of being judged with the busy terminal of this invention.

[Drawing 9] It is drawing showing the data resending sequence at the time of being judged with the low engine-performance terminal of this invention.

[Drawing 10] It is the flow chart which shows actuation of data resending to the busy terminal from the server of one example of this invention.

[Drawing 11] It is the flow chart which shows actuation of data resending in case there is a busy terminal of one example of this invention.

[Drawing 12] It is the flow chart of the data resending actuation to a low engine-performance terminal from the server of one example of this invention.

[Drawing 13] It is the sequence chart of the data resending actuation about the low engine-performance terminal of one example of this invention.

[Drawing 14] It is drawing showing the data resending sequence to conventional two or more terminals.

[Drawing 15] It is drawing showing the data resending sequence by the conventional notice of a busy.

### [Description of Notations]

10 Management Tool

20 Individual Management Tool

21 Resending Management Tool

22 Terminal Status Management Means

23 1st Low Engine-Performance Judging Means

24 2nd Low Engine-Performance Judging Means

25 Exclusion Means

30 Transmitting Means

40 Normal Terminal Management Means

100 Server

101 Resending Control Section

102 Communications Control Section

103 Application Management Department

104 Resending Management Department



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